

#3

FORM PTO-1390 REV. 5-93		US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEYS DOCKET NUMBER P00,1953
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 09/720,444
INTERNATIONAL APPLICATION NO. PCT/DE99/01830	INTERNATIONAL FILING DATE 23 JUNE 1999	PRIORITY DATE CLAIMED 23 JUNE 1998	
TITLE OF INVENTION METHOD FOR CONTROLLING THE HANDOVER OF TELECOMMUNICATION CONNECTIONS BETWEEN MOBILE PARTS AND BASE STATIONS IN CELLULAR TELECOMMUNICATIONS SYSTEMS HAVING WIRELESS TELECOMMUNICATION			
APPLICANT(S) FOR DO/EO/US		EDGAR BOLINTH, ET AL.	
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<p>1. <input type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input checked="" type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input checked="" type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.</p> <p>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</p> <p>5. <input type="checkbox"/> A copy of International Application as filed (35 U.S.C. 371(c)(2)) - drawings attached.</p> <p>a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</p> <p>b. <input type="checkbox"/> has been transmitted by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US)</p> <p>6. <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)) - drawings attached.</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</p> <p>b. <input type="checkbox"/> have been transmitted by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11. to 16. below concern other document(s) or information included:</p> <p>11. <input checked="" type="checkbox"/> A Supplemental Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; (PTO 1449, 18 references).</p> <p>12. <input checked="" type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included. (SEE ATTACHED ENVELOPE)</p> <p>13. <input type="checkbox"/> Amendment "A" Prior to Action.</p> <p><input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>14. <input type="checkbox"/> A Substitute Specification and Mark-Up Specification</p> <p>15. <input checked="" type="checkbox"/> A change of address letter attached to the Declaration.</p> <p>16. <input checked="" type="checkbox"/> Other items or information:</p> <p>a. <input checked="" type="checkbox"/> EXPRESS MAIL #EL655301205US dated February 23, 2001.</p>			

02/28/2001 UEDUVIJE 00000073 09720444

01 FC:154

130.00 GP

U.S. APPLICATION NO. (if known, see 37 C.F.R. 1.5)

09/720,444

INTERNATIONAL APPLICATION NO.

PCT/DE99/01830

ATTORNEY'S DOCKET NUMBER

P00,1953

17. ☐ The following fees are submitted:**BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5):**

Search Report has been prepared by the EPO or JPO \$860.00

International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) .. \$690.00

No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but
international search fee paid to USPTO (37 C.F.R. 1.445(a)(2)) \$710.00Neither international preliminary examination fee (37 C.F.R. 1.482) nor international
search fee (37 C.F.R. 1.445(a)(2)) paid to USPTO \$1000.00International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all
claims satisfied provisions of PCT Article 33(2)-(4) \$ 100.00**ENTER APPROPRIATE BASIC FEE AMOUNT =**

CALCULATIONS

PTO USE ONLY

Surcharge of \$130.00 for furnishing the oath or declaration later than ☐ 20 ☒ 30 months
from the earliest claimed priority date (37 C.F.R. 1.492(e)).

\$ 130.00

Claims

Number Filed

Number
Extra

Rate

Total Claims

05

- 20 =

0

X \$ 18.00

\$

Independent Claims

01

- 3 =

0

X \$ 80.00

\$

Multiple Dependent Claims

\$270.00+

\$

TOTAL OF ABOVE CALCULATIONS =

\$

Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also
be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)

\$

SUBTOTAL =

\$ 130.00

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months
from the earliest claimed priority date (37 CFR 1.492(f)).

\$

TOTAL NATIONAL FEE =

\$

Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be
accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). \$40.00 per property

\$

TOTAL FEES ENCLOSED =

\$ 130.00

Amount to be
refunded

\$

charged

\$

a. ☒ A check in the amount of \$ 130.00 to cover the above fees is enclosed.b. ☐ Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees.
A duplicate copy of this sheet is enclosed.c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any
overpayment to Deposit Account No. 50-1519. A duplicate copy of this sheet is enclosed.NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be
filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

SCHIFF HARDIN & WAITE
PATENT DEPARTMENT
6600 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606-6473

SIGNATURE

Steven H. Noll

NAME

28,982

Registration Number

Customer Number 26574

FORM PTO-1390
REV. 5-93

US DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE

ATTORNEYS DOCKET NUMBER
P00,1953

**TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371**

U.S. APPLICATION NO. (if known, see 37 CFR 1.5)

09/720444

INTERNATIONAL APPLICATION NO.
PCT/DE99/01830

INTERNATIONAL FILING DATE
23 JUNE 1999

PRIORITY DATE CLAIMED
23 JUNE 1998

TITLE OF INVENTION

**METHOD FOR CONTROLLING THE HANDOVER OF TELECOMMUNICATION CONNECTIONS BETWEEN MOBILE
PARTS AND BASE STATIONS IN CELLULAR TELECOMMUNICATIONS SYSTEMS HAVING WIRELESS
TELECOMMUNICATION**

APPLICANT(S) FOR DO/EO/US

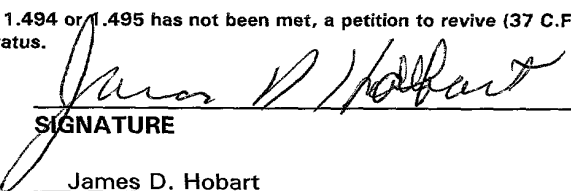
EDGAR BOLINTH, ET AL.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☒ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2)) - drawings attached.
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2))
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
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10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; (PTO 1449, Prior Art, Search Report, 6 references).
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included.
(SEE ATTACHED ENVELOPE)
13. ☒ Amendment "A" Prior to Action.
 - ☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☒ A Substitute Specification and Mark-Up Specification
15. ☐ A change of address letter attached to the Declaration.
16. ☒ Other items or information:
 - a. ☒ Submission of Drawings and Request for Approval of Drawing Changes
 - b. ☒ EXPRESS MAIL #EL655302917US dated December 22, 2000.

U.S. APPLICATION NO. (if known) 09/720444		INTERNATIONAL APPLICATION NO. PCT/DE99/01830		ATTORNEY'S DOCKET NUMBER P00,1953	
17. <input checked="" type="checkbox"/> The following fees are submitted:				CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5)): Search Report has been prepared by the EPO or JPO \$860.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) . . \$690.00 No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2)) \$710.00 Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2)) paid to USPTO \$1000.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) \$ 100.00 ENTER APPROPRIATE BASIC FEE AMOUNT =				\$ 860.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).				\$	
Claims	Number Filed	Number Extra	Rate		
Total Claims	05 - 20 =	0	X \$ 18.00	\$	
Independent Claims	01 - 3 =	0	X \$ 80.00	\$	
Multiple Dependent Claims			\$270.00 +	\$	
TOTAL OF ABOVE CALCULATIONS =				\$ 860.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)				\$	
SUBTOTAL =				\$ 860.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$ 860.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). \$40.00 per property				+	
TOTAL FEES ENCLOSED =				\$ 860.00	
				Amount to be refunded	\$
				charged	\$
a. <input checked="" type="checkbox"/> A check in the amount of \$ <u>860.00</u> to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>50-1519</u> . A duplicate copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO: SCHIFF HARDIN & WAITE PATENT DEPARTMENT 6600 Sears Tower 233 South Wacker Drive Chicago, Illinois 60606-6473					
SIGNATURE  James D. Hobart NAME 24,149 Registration Number					

BOX PCT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY - CHAPTER II

APPLICANT: BOLINTH, E. et al.
ATTORNEY DOCKET NO: P00,1953
INTERNATIONAL APPLICATION NO: PCT/DE99/01830
INTERNATIONAL FILING DATE: 23 DEC 1999
INVENTION: METHOD FOR CONTROLLING HANDOVER
OF TELECOMMUNICATIONS
CONNECTIONS BETWEEN MOBILE PARTS
AND BASE STATIONS IN CELLULAR
TELECOMMUNICATIONS SYSTEMS

**AMENDMENT "A" PRIOR TO ACTION AND
SUBMISSION OF SUBSTITUTE SPECIFICATION**

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Applicant herewith submits an amendment and substitute specification in the
above-referenced PCT application, and respectfully requests entry of same prior to
examination in the United States National Examination Phase.

IN THE SPECIFICATION

Cancel the specification as filed and substitute the specification provided
herewith.

IN THE CLAIMS

Cancel claims 1 - 5 as filed, and substitute therefore new claims 6-10 as follows:

- - What is claimed is:

6. A method for controlling the handover of telecommunications connections in cellular telecommunications systems using wireless telecommunication, the method comprising the steps of:

initiating a telecommunications connections between an uncoordinated, unlicensed operation of the telecommunications system and a coordinated, licensed operation of the telecommunications system;

receiving on a first telecommunications channel in a first base station which supports uncoordinated, unlicensed system operation and is associated with a first cell (FZI), a message relevant in a first monitoring mode for handing off telecommunications connections, the messages in each case being sent by at least one second base station adjacent to the first base station which supports coordinated, licensed system operation or uncoordinated, unlicensed system operation and is in each case associated with a second cell; and

assessing in the first base station the information content and reception quality of the message, and transmitting a list of parameters, organized on the basis of the reception quality required for handing over the telecommunications connection, the list of parameters associated with any one of the second base stations on a second telecommunications.

7. The method of claim 6, wherein the first monitoring mode is switched on at predetermined periodic time intervals.

8. The method of claim 7, further comprising the step of initiating in the mobile part and/or the base station a second monitoring mode for handing off information relevant to telecommunications connections for transmitting asymmetric data links at a maximum data transmission rate, in the downlink direction and at a minimum data transmission rate, and in the uplink direction via the base station.

9. The method of claim 8, further comprising the step of initiating in the base station a second monitoring mode for handing off information relevant to telecommunications connections in order to establish an asymmetric data link at a minimum data transmission rate in the downlink direction, and at a maximum data transmission rate in the uplink direction via the base station.

10. The method of claim 9, wherein the wireless telecommunication is carried out using CDMA, FDMA or TDMA access methods, and using TDD or FDD principles. - -

IN THE ABSTRACT

Cancel the Abstract as filed, and substitute therefore the following Abstract of the Disclosure:

- - ABSTRACT OF THE DISCLOSURE

In a cellular telecommunications system using wireless telecommunication between mobile parts and base stations, a method of handing off telecommunications connections from uncoordinated, unlicensed operation of the system to coordinated,

licensed operation and vice versa. The method requires only simple circuitry and little energy consumption in the mobile parts. Initial monitoring is carried out in the base station, which supports uncoordinated, unlicensed system operation. - -

REMARKS

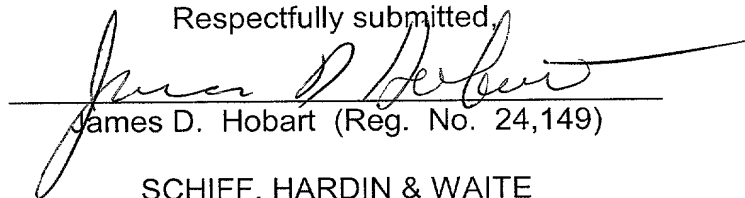
A substitute specification is provided herewith which make editorial changes in order to conform to standard US practice. A marker-up copy of the specification is also provided reflecting the changes made.

In addition, the claims as filed have been cancelled and replaced by new claims that more clearly set forth the subject matter of Applicant's invention.

No new matter has been inserted in the application.

Applicant submits that this application is in proper condition for examination in the United States national Examination Phase, which action is respectfully requested.

Respectfully submitted,



James D. Hobart (Reg. No. 24,149)

SCHIFF, HARDIN & WAITE
Patent Department
6600 Sears Tower
233 South Wacker Drive
Chicago, IL 60606
Telephone: (312) 258-5790
Attorneys for Applicant

Date: 12/22/2000

Substitute Specification:

**- METHOD FOR CONTROLLING HANDOVER OF
TELECOMMUNICATIONS CONNECTIONS BETWEEN MOBILE PARTS
AND BASE STATIONS IN CELLULAR TELECOMMUNICATIONS
SYSTEMS**

BACKGROUND OF THE INVENTION

Field of the Invention

In general, the present invention pertains to the field of wireless telecommunications. In particular, the present invention pertains to wireless telecommunication system handover controls.

Discussion of the Related Art

Telecommunications systems using wireless telecommunication between mobile and/or stationary transmitting/receiving appliances are specific message systems with a message transmission path between a message source and a message sink. In these systems, base stations and mobile parts are used as transmitting and receiving appliances for processing and transmitting messages in which the message processing and message transmission can be carried out in a preferred transmission direction (simplex operation) or in both transmission directions (duplex operation), the message processing is preferably digital and messages are transmitted via a long-distance transmission path without using wires.

The message processing and transmission is based on various message transmission methods to allow for multiple use of message transmission pats, such as FDMA (Frequency Division Multiple Access), TDMA (Time Division Multiple Access) or CDMA (Code Division Multiple Access). For instance, in accordance with standards such as DECT Digital Enhanced Cordless Telecommunication, as discussed in Nachrichtentechnik Elektronik [Information Technology, Electronics] 42 (1992) Jan/Feb, No. 1, Berlin, Germany, or in U. Pilger "Struktur des DECT-Standards" [Structure of the DECT Standard], pages 23 to 29 in conjunction with ETSI Publication ETS 3001750-1 October 9, 1992 and the DECT Publication from the DECT Forum, February 1997, pages 1 to 16], GSM [Groupe Special Mobile or Global System for Mobile Communication. See also, Informatik Spektrum [Information Technology Spectrum] 14 (1991) June, No. 3, Berlin, DE; A. Mann: "Der GSM-Standard - Grundlage für digitale europäische Mobilfunknetze", [The GSM Standard - Basis for Digital European Mobile Radio Networks, pages 137 to 152 in conjunction with the publication Telekom Praxis, April 1993, P. Smolka "GSM-Funkschnittstelle - Element und Funktionen", [GSM radio interface - Elements and functions], pages 17 to 24, UMTS [Universal Mobile Telecommunication System. Further discussion is provided by Nachrichtentechnik Elektronik, [Information Technology Electronics], Berlin 45, 1995, Issue 1, pages 10 to 14 and Issue 2, pages 24 to 27, and

by P. Jung, B. Steiner: "Konzept eines CDMA-Mobilfunk-systems mit gemeinsamer Detektion Für Die Dritte Mobilfunk-generation" [Concept of a CDMA Mobile Radio System with Joint Detection for Third Generation Mobile Radio], and by Nachrichtentechnik Elektronik, [Information Technology, Electronics], Berlin 41, 1991, Issue 6, pages 223 to 227 and page 234; P.W. Baier, P. Jung, A. Klein: "CDMA - ein günstiges Vielfachzugriffsverfahren für frequenzselektive und zeitvariante Mobilfunkkanäle"; [CDMA - A Useful Multiple Access Method For Frequency-Selective and Time-Variant Mobile Radio Channels]. Further discussion is given in IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences, Vol. E79-A, No. 12, December 1996, pages 1930 to 1937, and P.W. Baier, P. Jung: "CDMA Myths and Realities Revisited", and IEEE Personal Communications, February 1995, pages 38 to 47. Also see, A. Urie, M. Streeton, C. Mourot: "An Advanced TDMA Mobile Access System for UMTS", Telekom Praxis, 5/1995, pages 9 to 14; P.W. Baier: "Spread-Spectrum-Technik und CDMA - eine ursprünglich militärische Technik erobert den zivilen Bereich" [Spread Spectrum Technology and CDMA - An Originally Military Technology Wins Over the Civil Area], and in IEEE Personal Communications, February 1995, pages 48 to 53, in P.G. Andermo, L.M. Ewerbring: "An CDMA - Based Radio Access Design for UMTS", in ITO Fachberichte [Specialist Report] 124 (1993), Berlin, Offenbach: VDE Verlag ISBN 3-8007-1965-7,

pages 67 to 75, and in Dr. T. Zimmermann, Siemens AG: "Anwendung von CDMA in der Mobilkommunikation" [Use of CDMA in Mobile Communication]. Also see, Telecom Report 16, (1993), Issue 1, pages 38 to 41, a paper by Dr T. Ketseoglou, Siemens AG and Dr. T. Zimmermann, Siemens AG: "Effizienter Teilnehmerzugriff für die 3rd Generation der Mobilkommunikation - Vielfachzugriffsverfahren CDMA macht Luftschnittstelle flexibler"; [Efficient Subscriber Access for 3rd Generation Mobile Communication - The CDMA Multiple Access Method Makes the Air Interface More Flexible], and Funkschau 6/98: R. Sietmann "Ringeln um die UMTSSchnittstelle" [Ringling Round the UMTS Interface], pages 76 to 81] WACS or PACS, IS-54, IS-95, PHS, PDC etc., as well as IEEE Communications Magazine, January 1995, pages 50 to 57, and D.D. Falconer et al: "Time Division Multiple Access Methods for Wireless Personal Communications."

The word message is a generic term which covers not only the information content but also the physical representation of its signal. Despite a message having the same information content, different signal forms may occur. Thus, a message relating to one item can be transmitted in the form of an image, as spoken word, as written word, or as an encrypted word or image.

Transmission types are normally characterized as continuous (analog) signals, while discontinuous signals, although pulses, digital signals may also be used.

In telecommunications systems of the type mentioned above, the handover of an ongoing call or connection is a highly time-critical process, since the continuity of ongoing connections must be ensured. In particular, a distinction is often required between an intracell handover, an intercell handover and an external handover.

In order to carry out a handover between a mobile transmitting/receiving appliance, such as a mobile station or a mobile part connected to a stationary transmitting/receiving appliance, and a base station or a fixed part in a cell, cell-specific information about the adjacent cell, or about a number of adjacent cells is required. The method used to receive this information is referred to as monitoring, wherein the mobile station monitors a control channel, the so-called Broadcast Control CHannel (BCCH) on which the cell-specific information is broadcast by the base station.

One problem with this method relates to how the mobile station obtains the required cell-specific information and the current parameters, such as, frequency, timeslot, and the code of the adjacent base station to which the connection is intended to be transferred by the handover procedure and to which the handover is then intended to be made, when

the mobile station is in an uncoordinated, unlicensed scenario. Such a scenario involves an arrangement where there are a large number of unsynchronized residential base stations, or in a purely coordinated, licensed cellular scenario, say in the case of a TDD-UMTS system, the scenario involves virtually all the physical channels occupied by data traffic which makes it almost impossible to receive the Broadcast Control CHannel of the adjacent base stations due to high data rates encountered.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method for telecommunications connections to be handed off from uncoordinated, unlicensed operation to coordinated, licensed operation.

It is another object of the invention to provide a method for initial monitoring in a base station supporting uncoordinated, unlicensed system operation.

It is an additional object of the invention to provide a method to carry-out a time-critical handover from indoor to outdoor.

It is a further object of the invention to provide a method for initial monitoring where high asymmetric data rates are used.

These and other objects of the invention will become apparent upon careful review of the following disclosure, which is to be read in conjunction with review of the accompanying drawing figure.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a universal mobile telecommunications network;

Figure 2 shows a modified universal mobile telecommunications network;

Figure 3 shows a mobile station according to the present invention;

Figure 4 shows another mobile station according to the present invention; and

Figure 5 shows another mobile station according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 shows one possible UMTS scenario (Universal Mobile Telecommunication System) with a multicell universal mobile telecommunications system. UMTS operates using both the uncoordinated, unlicensed system mode and the coordinated, licensed system mode.

The UMTS system shown in Figure 1 has a first telecommunications subsystem TKTSI which operates in first radio cells FZI using wireless telecommunication between a first base station BS1, in the form of an indoor base station, and n mobile stations, MS1... . Msn. The mobile stations, MS1 ... MSn are preferably in the form of indoor/outdoor mobile stations, and are operated in the uncoordinated, unlicensed system mode. The UMTS system has a second

telecommunications subsystem TKST2, which operates in second radio cells FZ2, using wireless telecommunication between a second base station BS2, which is also in the form of an outdoor base station, and m second mobile stations $M_{sn+1} \dots M_{sn+m}$. The base stations, $M_{sn+1} \dots M_{sn+m}$, are preferably in the form of indoor/outdoor mobile stations, and are operated in the coordinated, licensed system mode.

A mobile assisted handover is carried out in the known GSM scenario. Monitoring is carried out by the mobile station during the free timeslots. That is to say, when the mobile station autonomously receives the BCCH of the adjacent base stations. The mobile station selects that base station whose reception quality is the best, and signals this to its own base station. The handover in this case is initiated by the mobile station and is controlled by the base station. This is referred to as a mobile assisted handover. A critical factor in this case is for the mobile station to have already received advance information from the network operator, and on its active BCCH on the frequencies to be searched in the adjacent base stations.

In contrast to the GSM scenario, a mobile initiated and mobile controlled handover is carried out according to the DECT scenario. Monitoring is in this case carried out by the mobile station, and the handover is likewise controlled by the mobile station. The mobile station in this case has no advance information about which channels, i.e. which

frequencies/timeslots - must be looked for during monitoring for the Broadcast Control CHannels of the adjacent cells. The BCCH, according to the DECT terminology, correspond to the channels in which dummy bearer information is transmitted.

A mobile assisted handover is likewise planned, as for the GSM scenario, for the cellular UMTS scenario, which is currently subject to standardization. The monitoring is carried out by the mobile part, and the handover is initiated by the mobile station and is controlled by the base station. It is highly probable that advance information from the network operator will also be required in this case about which channels [lacuna] (these are essentially the codes, since the frequency reuse is unity).

In all the scenarios mentioned above, the monitoring is carried out by means of the mobile station.

The problem of initial monitoring, such as information about channels on which the Broadcast Control Channel of the adjacent cells can be received, has until now been solved in the cellular field by means of advance information provided in advance by the network operator and intended for the respective mobile station, with this advance information having been transmitted to the relevant mobile station by the active base station using the Broadcast Control CHannel. The only exception is the DECT scenario, since, in this case, there is no need for initial monitoring for the coordinated, licensed mode. It is thus necessary during cellular

DECT operation for the mobile station to continuously scan adjacent frequencies looking for the Broadcast Control CHannel for an intercell handover. However, with respect to standby times, this is not an optimum solution with respect to asymmetric data services and allocation of a number of timeslots. In uncoordinated DECT operation, only an intracell handover is possible, so that there is no need for initial monitoring.

In the past, no handover has existed from uncoordinated, unlicensed system operation to coordinated, licensed system operation such as residential TDD—UMTS system to the public FDD-UMTS or public TDD-UMTS system.

The idea on which the invention is based is to carry out the initial monitoring problem, mentioned initially, in the first base station which supports uncoordinated, unlicensed system operation.

This method offers the advantage that the BCCH search by the first base station, which supports uncoordinated, unlicensed system operation and has no a priori knowledge about the conditions in the adjacent cells, need be carried out only once by base stations arranged in the adjacent cells, when the appliance is switched on, and then may be carried out once again only at relatively long periodic intervals. This information is then signaled, such as using the BCCH to the mobile part or to the mobile station.

Fundamentally, the advantages for the mobile station are reduced power consumption, an increase in the standby time, the fact that the initial monitoring is carried out by the first base station, and reduced complexity in the case of pure residential mobile stations or indoor terminals. In addition, the complexity is integrated in the first base station.

Since the first base station receives cell specific information about the adjacent public cells only as a result of the initial monitoring (and, particularly for UMTS, a highly time-consuming computation process is required in order to detect a cell—specific scrambling code without advance information) a dual mode mobile station designed for indoor/outdoor purposes is for the first time able to carry out a particularly time-critical handover from indoor to outdoor.

The essential idea is for the monitoring to be carried out in the outdoor and indoor base station. Where high asymmetric data rates are used with TDD mode operation, this procedure offers advantages both for indoor to outdoor handover and for the intracell handover. Monitoring in the first base station can be used to provide an asymmetric service with a high downlink data rate and a low uplink data rate, and vice versa.

Monitoring in the first base station can also be used to provide interference measurement on another carrier frequency and, if required, to hand over the entire asymmetric connection to the other carrier frequency.

This is known as interfrequency handover. An indoor to outdoor handover while maintaining the high data rate is likewise possible.

If the monitoring functionality is integrated in the base station and in the mobile station, then an asymmetric service with a low downlink data rate and a high uplink data rate can be handed over from one carrier frequency to a carrier. In this situation, the monitoring cannot be carried out by the base station since virtually all the timeslots are used for reception in this case, and the monitoring is in this case carried out by the mobile station.

An exemplary embodiment of the invention will be explained with reference to Figures 2 to 7.

Based on the UMTS scenario, shown in Figure 1, the telecommunication system will operate both in the uncoordinated, unlicensed system mode and in the coordinated, licensed system mode.

Specifically, Figure 2 shows a modified UMTS scenario with initial monitoring. The first base station BS1 and the first mobile stations MS1 . . . Msn, as in the UMTS scenario in Figure 1, are located in the first radio cell FZ1.

Adjacency occurs when associated radio cells, such as the first radio cell FZ1 and the second radio cell FZ2, are adjacent to one another or overlap. As shown in figure 2, the second base station BSZ, which is located in the second radio cell FZ2, which completely covers the first

radio cell FZ1 with the first base station BS1, and, secondly, further second base stations BS1.1 . . . BS1.6 which, although they are in the form of first base stations BS1 are referred to as further second base stations BS2 owing to their adjacency to the first base station BS1 in the first radio cell FZ1. Second base stations BS1.1 . . . BS1.6 are arranged in further second radio cells FZ1.1 . . . FZ1.6, which are immediately adjacent to the first radio cell FZ1 with the first base station BS1, and are in the form of a first radio cell FZ1 but are referred to as further second radio cells FZZ owing to the adjacency to the first radio cell FZ1 with the first base station BS1.

For the initial monitoring, the first base station BS1, which supports uncoordinated, unlicensed system operation and is associated with the first cell, FZ1, in a first monitoring mode receives messages which are relevant for handing off telecommunications connections and which are transmitted by at least one of the second base stations BSZ, BS1.1 . . . BS1.6 which are adjacent to the first base station BS1, support coordinated, licensed system operation or uncoordinated, unlicensed system operation and are each associated with the second cell FZ2, FZ1.1 . . . FZ1.6. In each case one first telecommunications channel which is in the form of the BCCH.

After this, the first base station BS1 assesses the information content and reception quality of the received messages and transmits a

list, organized on the basis of the reception quality, of parameters which are required for handing over the telecommunications connection each associated with each one of the second base stations BSZ, BS1.1 . . . BS1.6, on a second telecommunications channel which is in the form of the BCCH, to the first mobile stations MS1 . . . MSn which are located in the first cell FZ1.

Figures 3 to 7 each show a timeslot representation with eight timeslots ZS1 . . . ZS8 to show the monitoring scenario for the base stations BS1, BSZ, BS1.1 . . . BS1.6 and the mobile stations MS1 . . . MSn, MSn+1 . . . MSn+m. The base stations BS1, BSZ, BS1.1 . . . BS1.6 use a first timeslot ZS1 as the BCCH, and that there is a bidirectional, asymmetric data link at a first frequency f_i in each case between the base stations BS1, BSZ, BS1.1 . . . BS1.6 and the mobile stations MS1.. MSn, MSn+1 . . . MSn+m, said data link in each case having a number of reception timeslots RxI and transmission timeslots TxI and in each case extending over at least the timeslots ZS2 . . . ZS6. Furthermore, the expression $M(f_2)$, $M(f_3)$ in each case indicates that the base stations BS1, BS2, BS1.1 . . . BS1.6 and/or the mobile stations MS1 . . . MSn, MSn+1 . . . MSn+m carry out monitoring M on a second frequency f_Z or on a third frequency f_3 .

Figure 3 shows that the mobile station MS1.. MSn, MSn+1 . . . MSn+m maintains a bidirectional, asymmetric data link with the reception

timeslots Rx1 and transmission timeslots Tx1 in the timeslots ZS1 . . . ZS6 with the base station BS1, BSZ, BS1.1 . . . BS1.6, that the base station BS1, BSZ, BS1.1 . . . BS1.6 maintains a further bidirectional data link to another mobile station in the timeslots ZS7, ZS8, and that the mobile station MS1 . . . MSn, MSn+1 . . . MSn+m initiates a second monitoring mode, for handing off information which is relevant to telecommunications networks, by monitoring M, for example, on the second frequency fZ in the timeslots ZS7, ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base stations BS1.1 . . . BS1.6.

Figure 4 shows that the mobile station MS1 . . . MSn, MSn+1 . . . MSn+m maintains a bidirectional, asymmetric data link with the reception timeslots Rx1 and transmission timeslots Tx1 in the timeslots ZS1... ZS6 with the base station BS1, BSZ, BS1.1 . . . BS1.6, that the mobile station MS1 . . . MSn, MSn+1 . . . MSn+m initiates the second monitoring mode for handing off information which is relevant for telecommunications connections by monitoring M. On the third frequency f3 in the timeslots ZS7, ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in

the uplink direction via the base station BS1, BSZ, BS1.1 . . . BS1.6, and that the base station BS1, BSZ, BS1.1 . . . BS1.6 initiates the second monitoring mode for handing off information which is relevant for telecommunications connections by monitoring M. On the second frequency fZ in the timeslots ZS7, ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BS2, BS1.1 . . . BS1.6.

Figure 5 shows that the mobile station MS1 . . . MSn, MSn+1 . . . MSn+m maintains a bidirectional asymmetric data link with the reception timeslots 3x1 and transmission timeslots Tx1 in the timeslots ZS1 . . . Z57 with the base station BS1, BSZ, BS1.1 . . . BS1.6, and that the base station BS1, BSZ, BS1.1 . . . BS1.6 initiates the second monitoring mode for handing off information which is relevant to telecommunications connections by monitoring M. On the second frequency fZ in the timeslot ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1 . . . BS1.6.

Figure 6 shows that the mobile station MS1 . . . MSn, MSn+1 . . . MSn+m maintains a bidirectional asymmetric data link with the reception

timeslots Rx1 and transmission timeslots Tx1 in the timeslots ZS1 . . . ZS7 with the base station BS1, BSZ, BS1.1 . . . BS1.6, and that the base station BS1, BSZ, BS1.1 . . . BS1.6 initiates the second monitoring mode for handing off information which is relevant to telecommunications connections by monitoring M. On the second frequency f2 in the timeslot ZS8, in order to transmit the asymmetric data link at a minimum data transmission rate, which can be predetermined, in the downlink direction and at a maximum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1 . . . BS1.6.

Figure 7 shows that the mobile station MS1. . . MSn, MSn+1 . . . MSn+m maintains a bidirectional, asymmetric data link with the reception timeslots 3x1 and transmission timeslots Tx1 in the timeslots ZS1 . . . ZS7 with the base station BS1, BS2, BS1.1 . . . BS1.6, that the mobile station MS1. . . MSn, MSn+1. . . MSn+m initiates the second monitoring mode for handing off information which is relevant to telecommunications connections by monitoring M. On the third frequency f3 in the timeslot ZS8, in order to transmit the asymmetric data link at a minimum data transmission rate, which can be predetermined, in the downlink direction and at a maximum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1 . . . BS1.6, and that the base station BS1.1 . . . BS1.6 initiates the second monitoring mode for handing off information which is relevant to telecommunications

connection by monitoring M. On the second frequency f2 in the timeslot ZS8, in order to transmit the asymmetric data link at a minimum data transmission rate, which can be predetermined, in the downlink direction and at a maximum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1.1 . . . BS1.6.

Although preferred embodiments of the invention have been described herein, it is to be understood that the invention is not limited to these embodiments, and that various changes and modifications thereto may be made without departing from the scope or spirit of the invention, which is defines by the following claims. - -

~~{Description}~~ **[Substitute Specification:]**

~~{Method for controlling the handover of telecommunications connections between mobile parts and base stations in cellular telecommunications systems using}~~ **[- METHOD FOR CONTROLLING HANDOVER OF**

TELECOMMUNICATIONS CONNECTIONS BETWEEN MOBILE PARTS AND BASE STATIONS IN CELLULAR TELECOMMUNICATIONS SYSTEMS

BACKGROUND OF THE INVENTION

Field of the Invention

In general, the present invention pertains to the field of wireless telecommunications. In particular, the present invention pertains to] wireless telecommunication [system handover controls.

Discussion of the Related Art]

Telecommunications systems using wireless telecommunication between mobile and/or stationary transmitting/receiving appliances are specific message systems with a message transmission path between a message source and a message sink~~{, in which, for example}~~. In these systems], base stations and mobile parts are used as transmitting and receiving appliances for processing and transmitting messages~~{, and}~~ in which {

1)) the message processing and message transmission can be carried out in a preferred transmission direction (simplex operation) or in both transmission directions (duplex operation), {

2)) the message processing is preferably digital **[and]**;

3)) messages are transmitted via ~~{the}~~ **[a]** long-distance transmission path without using wires[.

The message processing and transmission is] based on various message transmission methods **[to allow]** for multiple use of ~~{the}~~ message transmission ~~{path}~~ **[paths, such as]** FDMA (Frequency Division Multiple Access), TDMA (Time Division Multiple Access) ~~{and/or}~~ **[or]** CDMA (Code Division Multiple Access) ~~{for example}~~ **[. For instance,]** in accordance with ~~{Radio Standards}~~ **[standards]** such as { }DECT ~~{Digital Enhanced {(previously: European)}~~ Cordless Telecommunication~~{; see}~~ **[, as discussed in]** Nachrichtentechnik Elektronik [Information Technology, Electronics] 42 (1992) Jan/Feb, No. 1, Berlin, ~~{DE;}~~ **[Germany, or in]** U. Pilger "Struktur des DECT-Standards" [Structure of the DECT Standard], pages 23 to 29 in conjunction with ETSI Publication ETS 3001750-1~~{...}~~ **[October]** 9, ~~{October}~~ 1992 and the DECT Publication from the DECT Forum, February 1997, pages 1 to 16], GSM [Groupe Special Mobile or Global System for Mobile Communication~~{; see}~~ **[. See also,]** Informatik Spektrum [Information Technology Spectrum] 14 (1991) June, No. 3, Berlin, DE; {

}A. Mann: "Der GSM-Standard - Grundlage für digitale europäische Mobilfunknetze", [The GSM Standard - Basis for ~~{digital}~~ **[Digital]** European ~~{mobile radio networks}~~ **[Mobile Radio Networks]**, pages 137 to 152 in conjunction with the publication ~~{telekom-praxis 4/1993}~~ **[Telekom Praxis, April 1993]**, P. Smolka "GSM-Funkschnittstelle - Element und Funktionen", [GSM radio interface - Elements and functions], pages 17 to 24, {

}UMTS [Universal Mobile Telecommunication System~~{, see (1)}~~].

Further discussion is provided by Nachrichtentechnik Elektronik, [Information Technology Electronics], Berlin 45, 1995, Issue 1, pages 10 to 14 and Issue 2, pages 24 to 27~~{}~~], **and by** P. Jung, B. Steiner:

"Konzept eines CDMA-~~{Mobilfunksystems}~~ **[Mobilfunk-systems]** mit gemeinsamer Detektion ~~{für die dritte Mobilfunkgeneration}~~ **[Für Die Dritte Mobilfunk-generation]**" [Concept of a CDMA ~~{mobile radio system with joint detection for third-generation mobile radio}~~; ~~(2)~~] **[Mobile**

Radio System with Joint Detection for Third Generation Mobile

Radio], **and by** Nachrichtentechnik Elektronik, [Information Technology, Electronics], Berlin 41, 1991, Issue 6, pages 223 to 227 and page 234;

P.W. Baier, P. Jung, A. Klein: "CDMA - ein günstiges

Vieifachzugriffsverfahren für frequenzselektive und zeitvariante

Mobilfunkkanäle"; [CDMA - A ~~{useful multiple access method for~~

~~frequency-selective and time-variant mobile radio channels}~~; ~~(3)~~] **[Useful**

Multiple Access Method For Frequency-Selective and Time-Variant

Mobile Radio Channels]. Further discussion is given in] IEICE

Transactions on Fundamentals of Electronics, Communications and
Computer Sciences, Vol. E79-A, No. 12, December 1996, pages 1930 to

1937~~{;}~~], **and] P.W. Baier, P. Jung: "CDMA Myths and Realities**

Revisited"~~{; (4);}~~], **and] IEEE Personal Communications, February 1995,**

pages 38 to 47~~{;}~~]. **Also see,] A. Urie, M. Streeton, C. Mourot: "An**

Advanced TDMA Mobile Access System for UMTS"~~{; (5); telekom-praxis;~~

~~}~~], **Telekom Praxis,] 5/1995, pages 9 to 14; P.W. Baier:**

"Spread-SpectrumTechnik und CDMA - eine ursprünglich militärische

Technik erobert den zivilen Bereich" [Spread ~~{spectrum technology and~~

~~CDMA - an originally military technology wins over the civil area]; (6);}~~

[Spectrum Technology and CDMA - An Originally Military Technology

Wins Over the Civil Area], and in] IEEE Personal Communications,

February 1995, pages 48 to 53~~{;}~~], **in] P.G. Andermo, L.M. Ewe rbring:**

"An CDMA -Based Radio Access Design for UMTS"~~{; (7);}~~], **in] ITO**

Fachberichte [Specialist Report] 124 (1993), Berlin, Offenbach: VDE

Verlag ISBN 3-8007-1965-7, pages 67 to 75~~{;}~~], **and in] Dr. T.**

Zimmermann, Siemens AG: "Anwendung von CDMA in der

Mobilkommunikation" [Use of CDMA in ~~{mobile communication}; (8);~~

~~telecom report}~~ **[Mobile Communication]. Also see, Telecom Report]**

16, (1993), Issue 1, pages 38 to 41~~{;}~~], **a paper by] Dr T. Ketseoglou,**

Siemens AG and Dr. T. Zimmermann, Siemens AG: "Effizienter Teilnehmerzugriff für die {3-} **[3rd]** Generation der Mobilkommunikation - Vielfachzugriffsverfahren CDMA macht Luftschnittstelle flexibler"; [Efficient {subscriber access for 3rd generation mobile communication - the CDMA multiple access method makes the air interface more flexible}; (9)-]

[Subscriber Access for 3rd Generation Mobile Communication - The CDMA Multiple Access Method Makes the Air Interface More

Flexible], and] Funkschau 6/98: R. Sietmann "Ringend um die UMTS-Schnittstelle" [Ringing {round} **[Round]** the UMTS {interface} **[Interface]**], pages 76 to 81] WACS or PACS, IS-54, IS-95, PHS, PDC etc.{{see}}, **as well as]** IEEE Communications Magazine, January 1995, pages 50 to 57{)}, **and]** D.D. Falconer et al: "Time Division Multiple Access Methods for Wireless Personal Communications{"]}."]

{Message} **[The word message]** is a generic term which covers not only the information content but also the physical representation of its signal. Despite a message having the same information content, different signal forms may occur. Thus, {for example,} a message relating to one item can be transmitted {

{1)} in the form of an image, {

{2)} as {the} spoken word, {

{3)} as {the} written word[, **or**]{(4)} as an encrypted word or image.

Transmission types ~~{{(4) ... (3) are in this case}}~~ **[are]** normally characterized ~~{by}~~ **[as]** continuous (analog) signals, while discontinuous signals~~{{for example}},~~ **[although]** pulses, digital signals ~~{}~~ normally occur in transmission type ~~(4)}~~ **[may also be used]**.

In telecommunications systems of the type mentioned above, the ~~{handover and}~~ handover of an ongoing call or connection is a highly time-critical process, since the continuity of ongoing connections must be ensured. ~~{Particularly in telecommunications systems using wireless telecommunication, various situations or cases occur in which a handover or a handover is possible, or even necessary. Corresponding to these situations a distinction is drawn, for example,}~~ **[In particular, a distinction is often required]** between an intracell handover, an intercell handover and an external handover ~~{etc}~~.

In order to carry out a handover~~{, for example,}~~ **[between]** a mobile ~~{transmitting/receiving}~~ **[transmitting/ receiving]** appliance, ~~{for example}~~ **[such as]** a mobile station or a mobile part ~~{which is}~~ connected to a stationary transmitting/receiving appliance, ~~{for example}~~ **[and]** a base station or a fixed part in a cell, ~~{requires}~~ cell-specific information about the adjacent cell, or about a number of adjacent cells **[is required]**. The method used to receive this information is referred to as monitoring, ~~{that is to say}~~ **[wherein]** the mobile station monitors~~{, for example,}~~ a control channel, the so-called Broadcast Control CHannel (BCCH) on which the

cell-specific information ~~{mentioned above}~~ is broadcast by the base station.

One problem **[with this method]** relates to how the mobile station obtains the required cell-specific information and the current parameters, ~~{that is to say}~~ **[such as,]** frequency, timeslot, **[and the]** code of the adjacent base station to which the connection is intended to be transferred by the handover procedure and to which the handover is then intended to be made, when the mobile station is in an uncoordinated, unlicensed scenario~~{- for example in}~~. **Such a scenerio involves** an arrangement where there are a large number of unsynchronized residential base stations~~{-}~~**[,]** or in a purely coordinated, licensed cellular scenario~~{- for example as}~~**[, say]** in the **[case of a]** TDD-UMTS system~~{- and, due to a high data rate,}~~**[, the scenario involves]** virtually all the physical channels ~~{are}~~ occupied by data traffic ~~{and}~~ **[which makes]** it ~~{is thus}~~ **[almost]** impossible to receive the Broadcast Control CHannel of the adjacent base stations **[due to high data rates encountered.**

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method for telecommunications connections to be handed off from uncoordinated, unlicenced operation to coordinated, licensed operation.

It is another object of the invention to provide a method for initial monitoring in a base station supporting uncoordinated, unlicensed system operation.

It is an additional object of the invention to provide a method to carry-out a time-critical handover from indoor to outdoor.

It is a further object of the invention to provide a method for initial monitoring where high asymmetric data rates are used.

These and other objects of the invention will become apparent upon careful review of the following disclosure, which is to be read in conjunction with review of the accompanying drawing figure.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a universal mobile telecommunications network;

Figure 2 shows a modified universal mobile telecommunications network;

Figure 3 shows a mobile station according to the present invention;

Figure 4 shows another mobile station according to the present invention; and

Figure 5 shows another mobile station according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT]

}

Figure 1 shows one possible UMTS scenario (Universal Mobile Telecommunication System) with a multicell universal mobile telecommunications system[.] UMTS ~~{which}~~ operates using both the uncoordinated, unlicensed system mode and the coordinated, licensed system mode ~~{and includes both the scenarios mentioned above. The illustrated UMTS system}~~[.]

The UMTS system shown in Figure 1] has a first telecommunications subsystem TKTS1 which operates in first radio cells FZ1 using wireless telecommunication between a first base station BS1, ~~{which is}~~ in the form of an indoor base station, and ~~n {(n<N)} first~~ mobile stations, MS1... . ~~{MSn, which}~~ **[Msn. The mobile stations, MS1 ... MSn]** are preferably in the form of indoor/outdoor mobile stations, and ~~{which system is operating}~~ **[are operated]** in the uncoordinated, unlicensed system mode. ~~{Furthermore, the}~~ **[The]** UMTS system has a second telecommunications subsystem TKST2, which operates in second radio cells FZ2, using wireless telecommunication between a second base station BS2, which is **[also]** in the form of an outdoor base station, and ~~m {(m<N)}~~ second mobile stations ~~{MSn+1...MSn+m, which}~~ **[Msn+1 ... Msn+m. The base stations, Msn+1 ... Msn+m,]** are preferably in the

form of indoor/outdoor mobile stations, and ~~{which system is operating}~~
[are operated] in the coordinated, licensed system mode.

{

~~A further problem is how the monitoring for a handover from
uncoordinated, unlicensed system operation to coordinated licensed
system operation must appear.~~

}A mobile assisted handover is carried out in the known GSM scenario.

~~{The monitoring is in this case}~~ **[Monitoring is]**carried out by the mobile

station during the free timeslots~~{, that}~~. **[That]** is to say~~[, when]~~ the

mobile station autonomously receives the ~~{Broadcast Control Channels}~~

[BCCH] of the adjacent base stations~~{,}~~. **[The mobile station]** selects

that base station whose reception quality is the best, and signals this to its

own base station. The handover ~~{is}~~ in this case **[is]** initiated by the

mobile station and is controlled by the base station~~{, this}~~. **[This]** is

~~{therefore}~~ referred to as a mobile assisted handover. A ~~{factor which is~~

~~of}~~ critical ~~{importance}~~ **[factor]** in this case is for the mobile station to

have already received advance information from the network operator,

[and] on its active ~~{Broadcast Control Channel}~~ **[BCCH]** on the

frequencies to be searched ~~{for the Broadcast Control Channels of}~~ **[in]**

the adjacent base stations.

In contrast to the GSM scenario, a mobile initiated and mobile
controlled handover is carried out ~~{in}~~ **[according to]** the ~~{known}~~ DECT

scenario. ~~{The monitoring}~~ **[Monitoring]** is in this case carried out by the mobile station, and the handover is likewise controlled by the mobile station. The mobile station in this case has no advance information about which channels~~{-that is to say}~~**[, i.e.]** which frequencies/timeslots - must be looked for during monitoring for the Broadcast Control CHannels of the adjacent cells. The ~~{Broadcast Control CHannels}~~ **[BCCH]**, according to the DECT terminology, correspond to the channels in which ~~{the}~~ dummy bearer information is transmitted.

A mobile assisted handover is likewise planned, as for the GMS scenario, for the cellular UMTS scenario, which is currently subject to standardization. The monitoring is carried out by the mobile part, and the handover is initiated by the mobile station and is controlled by the base station. It is highly probable that advance information from the network operator will also be required in this case about which channels ~~[lacuna]~~ (these are essentially the codes, since the frequency reuse is unity).

In all the scenarios mentioned above, the monitoring is carried out by means of the mobile station.

The problem of initial monitoring ~~{}~~**[,such as]** information about channels on which the Broadcast Control ~~{Channel}~~ **[Channel]** of the adjacent cells can be received~~{}~~**[,]** has until now been solved in the cellular field by means of advance information provided in advance by the network operator and intended for the respective mobile station, with this

advance information having been transmitted to the relevant mobile station by the active base station using the Broadcast Control CHannel. The only exception is the DECT scenario, since, in this case, there is no need for initial monitoring for the coordinated, licensed mode. It is thus necessary during cellular DECT operation for the mobile station to continuously scan adjacent frequencies looking for the Broadcast Control CHannel for an intercell handover. However, with respect to standby times, this is not an optimum solution ~~{{lacuna}}~~ **[with respect to]** asymmetric data services ~~{{[and] allocation of a number of timeslots}}~~. In uncoordinated DECT operation, only an intracell handover is possible, so that there is no need for initial monitoring.

In the past, no handover has existed from uncoordinated, unlicensed system operation to coordinated, licensed system operation ~~{{(for example)}~~ **[such as]** residential TDD—UMTS system to the public FDD-UMTS or public TDD-UMTS system.

~~{The object on which the invention based, in a cellular telecommunications system using wireless telecommunication between mobile parts and base stations, is to provide for telecommunications connections to be handed off from uncoordinated, unlicensed operation of the telecommunications system (residential operation or private operation) to coordinated, licensed operation of the telecommunications system~~

~~(public operation) and vice versa, with little energy being consumed in the mobile part and with little circuitry complexity in the mobile part.~~

~~This object is achieved by the features of patent claim 1.~~

}The idea on which the invention is based is to carry out the initial monitoring problem, mentioned initially, in the **[first]** base station ~~{{first base station}}~~ which supports uncoordinated, unlicensed system operation.

This method offers the advantage that the ~~{Broadcast Control Channel}~~ **[BCCH]** search by the first base station, which supports uncoordinated, unlicensed system operation and has no a priori knowledge about the conditions in the adjacent cells, need be carried out only once by base stations arranged in the adjacent cells, when the appliance is switched on, and then may be carried out once again only at relatively long periodic intervals~~{{see the advantageous development as claimed in claim 2}}~~. This information is then ~~{signalled (for example using the Broadcast Control Channel)}~~ **[signaled, such as using the BCCH]** to the mobile part or to the mobile station.

Fundamentally, the advantages for the mobile station are ~~{the}~~ reduced power consumption, ~~{the}~~ **[an]** increase in the standby time, the fact that the initial monitoring is carried out by the first base station, and ~~{the}~~ reduced complexity in the case of pure residential mobile stations or

indoor terminals~~{}~~[. **In addition,**] the complexity is integrated in the first base station~~{}~~].[.]

~~{Since the first base station receives cell specific~~
[Since the first base station receives cell specific] information about the adjacent public cells only as a result of the initial monitoring (and, particularly for UMTS, a highly time-consuming computation process is required in order to detect a cell—specific scrambling code without advance information) a dual mode mobile station designed for ~~{indoor/outdoor}~~ **[indoor/ outdoor]** purposes is for the first time able to carry out a particularly time-critical handover from indoor to outdoor.

~~{In the developments of the invention as claimed in claims 3 and 4,~~
~~the}~~ **[The]** essential idea is for the monitoring to be carried out in the outdoor and indoor base station. Where high asymmetric data rates are used ~~{(possible only in the TDD mode)}~~ **[with TDD mode operation]**, this procedure offers advantages both for ~~{the}~~ indoor to outdoor handover and for the intracell handover. ~~{The monitoring}~~ **[Monitoring]** in the first base station can ~~{thus}~~ be used to provide an asymmetric service with a high downlink data rate and a low uplink data rate, and vice versa~~{, as well as}~~[. **Monitoring in the first base station can also be used to provide]** interference measurement on another carrier frequency and, if required, to hand over the entire asymmetric connection to the other carrier frequency~~{(interfrequency handover).}~~[. **This is known as**

interfrequency handover.] An indoor to outdoor handover while maintaining the high data rate is likewise possible.

If the monitoring functionality is integrated ~~{not only}~~ in the base station ~~{but also}~~ **[and]** in the mobile station, then an asymmetric service with a low downlink data rate and a high uplink data rate can be handed over from one carrier frequency to a carrier~~{(interfrequency handover)}~~. In this situation, the monitoring cannot be carried out by the base station since virtually all the timeslots are used for reception in this case~~{-}~~ **[,]** and the monitoring is in this case carried out by the mobile station.

An exemplary embodiment of the invention will be explained with reference to Figures 2 to 7~~{, in which:-}~~ **[.]**

Based on the UMTS scenario ~~{with the detail from a universal mobile telecommunications network and a universal mobile telecommunications system, as shown in Figure 1, which operates}~~ **[, shown in Figure 1, the telecommuni-cation system will operate]** both in the uncoordinated, unlicensed system mode and in the coordinated, licensed system mode**[.]**

Specifically], Figure ~~{Z}~~ **[2]** shows a modified UMTS scenario with initial monitoring**[. The first base station BS1 and the first]**~~{,~~ Figures 3 to 7 show timeslot illustrations for the monitoring by the base stations BS1, BS2 and the ~~}~~ mobile stations MS1 . . . **[. MSn,]**~~{-MSn, MSn+1. . . MSn+m.~~

Based on the UMTS scenario with the detail from a universal mobile telecommunications network and a universal mobile telecommunications system, as shown in Figure 1, which operates both in the uncoordinated, unlicensed system mode and in the coordinated, licensed system mode, Figure 2 shows a modified UMTS scenario with initial monitoring, In the modified UMTS scenario, universal mobile telecommunications system, as shown in Figure 1, which operates both in the uncoordinated, unlicensed system mode and in the coordinated, licensed system mode, Figure Z shows a modified UMTS scenario with initial monitoring, the first base station BS1 and the first mobile stations MS1.. .MSn-} as in the UMTS scenario in Figure 1{-}[,] are located in the first radio cell FZ1.

{Adjacent to this first base station BS1 - in which case, for example, adjacency occurs, by definition, when the} **[Adjacency occurs when]** associated radio cells, **[such as]** the first radio cell FZ1 and the second radio cell FZ2, are adjacent to one another or overlap{- there are, firstly}[,]. **As shown in figure 2]**, the second base station BSZ, which is located in the second radio cell FZ2, which completely covers the first radio cell FZ1 with the first base station BS1, and, secondly, further second base stations BS1.1 . . .BS1.6 which, although they are in the form of first base stations BS1 are referred to as further second base stations BS2 owing to their adjacency to the first base station BS1 in the first radio cell FZ1{-, and which second}[,]. **Second]** base stations BS1.1 . . . {-BS1.6}[,]. **BS1.6]** are

arranged in further second radio cells FZ1.1 . . . ~~{FZ1.6}~~ **[FZ1.6]**, which are immediately adjacent to the first radio cell FZ1 with the first base station BS1 **[,]** and are ~~{admittedly}~~ in the form of a first radio cell FZ1 but are referred to as further second radio cells FZZ owing to the adjacency to the first radio cell FZ1 with the first base station BS1.

For the initial monitoring, the first base station BS1, which supports uncoordinated, unlicensed system operation and is associated with the first cell, FZ1, in a first monitoring mode receives messages which are relevant for handing off telecommunications connections and which are transmitted by at least one of the second base stations BSZ, BS1.1 . . . ~~{BS1.6}~~ **[BS1.6]** which are adjacent to the first base station BS1, support coordinated, licensed system operation or uncoordinated, unlicensed system operation and are each associated with the second cell FZ2, FZ1.1 . . . ~~{FZ1.6, on in}~~ **[FZ1.6. In]** each case one first telecommunications channel which is in the form of the ~~{Broadcast Control Channel}~~ BCCH.

After this, the first base station BS1 assesses the information content and reception quality of the received messages and transmits a list, organized on the basis of the reception quality, of parameters which are required for handing over the telecommunications connection ~~{and are}~~ each associated with **[each]** one of the second base stations BSZ, BS1.1 . . . ~~{BS1.6}~~ **[BS1.6]**, on a second telecommunications channel

which is in the form of the ~~{Broadcast Control Channel}~~ BCCH, to the first mobile stations MS1 . . . ~~{MSn}~~ **[. MSn]** which are located in the first cell FZ1.

Figures 3 to 7 each ~~{use}~~ **[show]** a timeslot representation with eight timeslots ZS1 . . . ZS8 to show the monitoring scenario for **[the base stations BS1, BSZ, BS1.1 . . . BS1.6 and the mobile stations MS1 . . . MSn, MSn+1 . . . MSn+m. The base stations BS1, BSZ, BS1.1 . . . BS1.6 use a first timeslot ZS1 as the BCCH, and that there is a bidirectional, asymmetric data link at a first frequency fi in each case between]** the base stations BS1, BSZ, BS1.1 . . . BS1.6 and the mobile stations MS1.. .MSn, MSn+1.~~{. MSn+m. Common features of all the figures 3 to 7 are that the base stations BS1, BSZ, BS1.1 . . . BS1.6 use a first timeslot ZS1 as the Broadcast Control Channel BCCH, and that there is a bidirectional, asymmetric data link at a first frequency fi in each case between the base stations BS1, BSZ, BS1.1 . . . BS1.6 and the mobile stations MS1.. .MSn, MSn+1.} . . . MSn+m, said data link in each case having a number of reception timeslots Rx1 and transmission timeslots Tx1 and in each case extending over at least the timeslots ZS2 . . . ZS6. Furthermore, {for example,} the expression M(f2), M(f3) in each case indicates that the base stations BS1, BS2, BS1.1 . . . {BS1.6}~~ **[. BS1.6]** and/or the mobile stations MS1 . . . ~~{MSn, MSn+1 . . . MSn+m}~~ **[. MSn,**

MSn+1 . . . MSn+m] carry out monitoring M on a second frequency fZ or on a third frequency f3.

{

In detail, said figures show the following information:

Figure 3 shows that the mobile station MS1.. .MSn, ~~{MSn+1.. .MSn+m}~~
[MSn+1 . . . MSn+m] maintains a bidirectional, asymmetric data link with the reception timeslots RxI and transmission timeslots TxI in the timeslots ZS1 . . . ZS6 with the base station BS1, BSZ, BS1.1 . . ~~{BS1.6}~~**[. BS1.6]**, that the base station BS1, BSZ, BS1.1 . . ~~{BS1.6}~~**[. BS1.6]** maintains a further bidirectional data link to another mobile station in the timeslots ZS7, ZS8, and that the mobile station MS1 . . ~~{MSn}~~**[. MSn]**, MSn+1. . ~~{..MSn+m}~~**[. MSn+m]** initiates a second monitoring mode, for handing off information which is relevant to telecommunications networks, by monitoring M, for example, on the second frequency fZ in the timeslots ZS7, ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base stations BS1.1. . ~~{BS1.6}~~**[. BS1.6]**.

Figure 4 shows that the mobile station MS1 . . ~~{MSn, MSn+1.. .MSn+m}~~**[. MSn, MSn+1 . . . MSn+m]** maintains a bidirectional, asymmetric data link with the reception timeslots RxI and transmission

timeslots Tx1 in the timeslots ZS1... ZS6 with the base station BS1, BSZ, BS1.1 . . . {BS1.6} [**BS1.6**], that the mobile station MS1. . . MSn, MSn+1. . . MSn+m initiates the second monitoring mode for handing off information which is relevant for telecommunications ~~{connections}~~ [**connec-tions**] by monitoring M ~~{for example, on}~~ [**On**] the third frequency f3 in the timeslots ZS7, ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1 . . . {BS1.6} [**BS1.6**], and that the base station BS1, BSZ, BS1.1 . . . {BS1.6} [**BS1.6**] initiates the second monitoring mode for handing off information which is relevant for telecommunications connections by monitoring M ~~{for example, on}~~ [**On**] the second frequency fZ in the timeslots ZS7, ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BS2, BS1.1 . . . {BS1.6} [**BS1.6**]

Figure 5 shows that the mobile station MS1 . . . ~~{MSn, MSn+1. . . MSn+m}~~ [**MSn, MSn+1 . . . MSn+m**] maintains a bidirectional asymmetric data link with the reception timeslots 3x1 and transmission timeslots Tx1 in the timeslots ZS1 . . . ZS7 with the base station BS1,

BSZ, BS1.1 . . . ~~{BS1.6}~~]. **BS1.6**], and that the base station BS1, BSZ, BS1.1 . . . ~~{BS1.6}~~]. **BS1.6** initiates the second monitoring mode for handing off information which is relevant to telecommunications connections by monitoring M~~{, for example, on}~~]. **On**] the second frequency fZ in the timeslot ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1 . . . ~~{BS1.6}~~]. **BS1.6**]

Figure 6 shows that the mobile station MS1 . . . ~~{MSn}~~]. **MSn**], MSn+1 . . . MSn+m maintains a bidirectional asymmetric data link with the reception timeslots Rx1 and transmission timeslots Tx1 in the timeslots ZS1 . . . ~~{ZS7}~~]. **[ZS7]** with the base station BS1, BSZ, BS1.1 . . . ~~{BS1.6}~~]. **BS1.6**], and that the base station BS1, BSZ, BS1.1 . . . ~~{BS1.6}~~]. **BS1.6** initiates the second monitoring mode for handing off information which is relevant to telecommunications ~~{connections}~~]. **[connec-tions]** by monitoring M~~{, for example, on}~~]. **On**] the second frequency f2 in the timeslot ZS8, in order to transmit the asymmetric data link at a minimum data transmission rate, which can be predetermined, in the downlink direction and at a maximum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1 . . . ~~{BS1.6}~~]. **BS1.6**]

Figure 7 shows that the mobile station MS1. . . MSn, ~~{MSn+1. . . MSn+m}~~ **[MSn+1 . . . MSn+m]** maintains a bidirectional, asymmetric data link with the reception timeslots 3x1 and transmission timeslots Tx1 in the timeslots ZS1 . . . ~~{ZS7}~~ **[ZS7]** with the base station BS1, BS2, BS1.1 . . . ~~{BS1.6}~~ **[BS1.6]**, that the mobile station MS1. . . MSn, MSn+1. . . MSn+m initiates the second monitoring mode for handing off information which is relevant to telecommunications ~~{connections}~~ **[connections]** by monitoring M~~{, for example, on}~~ **[. On]** the third frequency f3 in the timeslot ZS8, in order to transmit the asymmetric data link at a minimum data transmission rate, which can be predetermined, in the downlink direction and at a maximum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1 . . . ~~{BS1.6}~~ **[BS1.6]**, and that the base station BS1.1 . . . ~~{BS1.6}~~ **[BS1.6]** initiates the second monitoring mode for handing off information which is relevant to telecommunications connection by monitoring M~~{, for example, on}~~ **[. On]** the second frequency f2 in the timeslot ZS8, in order to transmit the asymmetric data link at a minimum data transmission rate, which can be predetermined, in the downlink direction and at a maximum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1.1 . . . ~~{BS1.6}~~ **[BS1.6]**

~~{Patent Claims}~~ **[Although preferred embodiments of the invention have been described herein, it is to be understood that the**

invention is not limited to these embodiments, and that various changes and modifications thereto may be made without departing from the scope or spirit of the invention, which is defines by the following claims. - -

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Description

Method for controlling the handover of telecommunications connections between mobile parts and base stations in cellular telecommunications systems using wireless telecommunication

5 Telecommunications systems using wireless telecommunication between mobile and/or stationary transmitting/receiving appliances are specific message systems with a message transmission path between a message source and a message sink, in which, for example, base stations and mobile parts are used as transmitting and receiving appliances for processing and transmitting messages, and in which

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- 1) the message processing and message transmission can be carried out in a preferred transmission direction (simplex operation) or in both transmission directions (duplex operation),
 - 5 2) the message processing is preferably digital,
 - 3) messages are transmitted via the long-distance transmission path without using wires based on various message transmission methods for multiple use of the message transmission path FDMA (Frequency Division Multiple Access), TDMA (Time Division Multiple Access) and/or CDMA (Code Division Multiple Access) for example in accordance with Radio Standards such as

15 **DECT** [Digital Enhanced (previously: European) Cordless Telecommunication; see *Nachrichtentechnik Elektronik* [Information Technology, Electronics] 42 (1992) Jan/Feb, No. 1, Berlin, DE; U. Pilger "Struktur des DECT-Standards" [Structure of the DECT Standard], pages 23 to 29 in conjunction with ETSI Publication ETS 3001750-1... 9, October 1992 and the DECT Publication from the DECT Forum, February 1997, pages 1 to 16], **GSM** [Groupe Special Mobile or Global System for Mobile Communication; see *Informatik Spektrum* [Information Technology Spectrum] 14 (1991) June, No. 3, Berlin, DE;

25 A. Mann: "Der GSM-Standard - Grundlage für digitale europäische Mobilfunknetze", [The GSM Standard - Basis for digital European mobile radio networks], pages 137 to 152 in conjunction with the publication *telekom praxis* 4/1993, P. Smolka "GSM-

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Funkschnittstelle - Element und Funktionen", [GSM radio interface - Elements and functions], pages 17 to 24,

UMTS [Universal Mobile Telecommunication System; see (1):

Nachrichtentechnik Elektronik, [Information Technology Electronics], Berlin 45, 1995, Issue 1, pages 10 to 14 and Issue 2, pages 24 to 27; P. Jung, B. Steiner: "Konzept eines CDMA-Mobilfunksystems mit gemeinsamer Detektion für die dritte Mobilfunkgeneration" [Concept of a CDMA mobile radio system with joint detection for third generation mobile radio]; (2):

Nachrichtentechnik Elektronik, [Information Technology, Electronics], Berlin 41, 1991, Issue 6, pages 223 to 227 and page 234; P.W. Baier, P. Jung, A. Klein: "CDMA - ein günstiges Vielfachzugriffsverfahren für frequenzselektive und zeitvariante Mobilfunkkanäle"; [CDMA - A useful multiple access method for frequency-selective and time-variant mobile radio channels]; (3):

IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences, Vol. E79-A, No. 12, December 1996, pages 1930 to 1937; P.W. Baier, P. Jung: "CDMA Myths and Realities Revisited"; (4): IEEE Personal Communications, February 1995,

pages 38 to 47; A. Urie, M. Streeton, C. Mourot: "An Advanced TDMA Mobile Access System for UMTS"; (5): telekom praxis, 5/1995, pages 9 to 14; P.W. Baier: "Spread-Spectrum Technik und CDMA - eine ursprünglich militärische Technik erobert den zivilen Bereich"

[Spread spectrum technology and CDMA - an originally military technology wins over the civil area]; (6): IEEE Personal

Communications, February 1995, pages 48 to 53; P.G. Andermo, L.M.

Ewerbring: "An CDMA -Based Radio Access Design for UMTS"; (7):

ITO Fachberichte [Specialist Report] 124 (1993), Berlin,

Offenbach: VDE Verlag ISBN 3-8007-1965-7, pages 67 to 75; Dr. T.

Zimmermann, Siemens AG: "Anwendung von CDMA in der

Mobilkommunikation" [Use of CDMA in mobile communication]; (8):

telcom report 16, (1993), Issue 1, pages 38 to 41; Dr T.

Ketseoglou, Siemens AG and Dr. T. Zimmermann, Siemens AG:

"Effizienter Teilnehmerzugriff für die 3. Generation der

Mobilkommunikation - Vielfachzugriffsverfahren CDMA macht

Luftschnittstelle flexibler"; [Efficient subscriber access for 3rd generation mobile communication - the CDMA multiple access method

makes the air interface more flexible]; (9): Funkschau 6/98: R. Sietmann "Ringgen um die UMTSSchnittstelle" [Ringgen round the UMTS interface], pages 76 to 81] WACS or PACS, IS-54, IS-95, PHS, PDC etc. [see IEEE Communications Magazine, January 1995, pages 50 to 57; D.D. Falconer et al: "Time Division Multiple Access Methods for Wireless Personal Communications"].

Message is a generic term which covers not only the information content but also the physical representation of its signal. Despite a message having the same information content, different signal forms may occur. Thus, for example, a message relating to one item can be transmitted

- (1) in the form of an image,
- (2) as the spoken word,
- (3) as the written word
- (4) as an encrypted word or image.

Transmission types (1) ... (3) are in this case normally characterized by continuous (analog) signals, while discontinuous signals (for example pulses, digital signals) normally occur in transmission type (4).

In telecommunications systems of the type mentioned above, the handover and handover of an ongoing call or connection is a highly time-critical process, since the continuity of ongoing connections must be ensured. Particularly in telecommunications systems using wireless telecommunication, various situations or cases occur in which a handover or a handover is possible, or even necessary. Corresponding to these situations a distinction is drawn, for example, between an intracell handover, an intercell handover and an external handover etc.

In order to carry out a handover, for example, a mobile transmitting/receiving appliance, for example a mobile station or a mobile part which is connected to a stationary transmitting/receiving appliance, for example a base station or a fixed part in a cell, requires cell-specific information about the adjacent cell, or about a number of adjacent cells. The method used to receive this information is referred to as monitoring, that is to say the mobile station monitors, for example, a control channel, the so-called Broadcast Control CHannel (BCCH) on which

the cell-specific information mentioned above is broadcast by the base station.

One problem relates to how the mobile station obtains the required cell-specific information and the current parameters, that is to say frequency, timeslot, code of the adjacent base station to which the connection is intended to be transferred by the handover procedure and to which the handover is then intended to be made, when the mobile station is in an uncoordinated, unlicensed scenario - for example in an arrangement where there are a large number of unsynchronized residential base stations - or in a purely coordinated, licensed cellular scenario - for example as in the TDD-UMTS system - and, due to a high data rate, virtually all the physical channels are occupied by data traffic and it is thus impossible to receive the Broadcast Control Channel of the adjacent base stations.

Figure 1 shows one possible UMTS scenario (Universal Mobile Telecommunication System) with a multicell universal mobile telecommunications system UMTS which operates using both the uncoordinated, unlicensed system mode and the coordinated, licensed system mode and includes both the scenarios mentioned above. The illustrated UMTS system has a first telecommunications subsystem TKTS1 which operates in first radio cells FZ1 using wireless telecommunication between a first base station BS1, which is in the form of an indoor base station, and n ($n \leq N$) first mobile stations, MS1... MSn, which are preferably in the form of indoor/outdoor mobile stations, and which system is operating in the uncoordinated, unlicensed system mode. Furthermore, the UMTS system has a second telecommunications subsystem TKST2, which operates in second radio cells FZ2, using wireless telecommunication between a second base station BS2, which is in the form of an outdoor base station, and m ($m \leq N$) second mobile stations MSn+1... MSn+m, which are preferably in the form of indoor/outdoor mobile stations, and which system is operating in the coordinated, licensed system mode.

A further problem is how the monitoring for a handover from uncoordinated, unlicensed system operation to coordinated licensed system operation must appear.

A mobile assisted handover is carried out in the known GSM scenario. The monitoring is in this case carried out by the mobile station during the free timeslots, that is to say the mobile station autonomously receives the Broadcast Control Channels of the adjacent base stations, selects that base station whose reception quality is the best, and signals this to its own base station. The handover is in this case initiated by the mobile station and is controlled by the base station; this is therefore referred to as a mobile assisted handover. A factor which is of critical importance in this case is for the mobile station to have already received advance information from the network operator, on its active Broadcast Control CHannel on the frequencies to be searched for the Broadcast Control CHannels of the adjacent base stations.

In contrast to the GSM scenario, a mobile initiated and mobile controlled handover is carried out in the known DECT scenario. The monitoring is in this case carried out by the mobile station, and the handover is likewise controlled by the mobile station. The mobile station in this case has no advance information about which channels - that is to say which frequencies/timeslots - must be looked for during monitoring for the Broadcast Control CHannels of the adjacent cells. The Broadcast Control CHannels, according to the DECT terminology, correspond to the channels in which the dummy bearer information is transmitted.

A mobile assisted handover is likewise planned, as for the GMS scenario, for the cellular UMTS scenario, which is currently subject to standardization. The monitoring is carried out by the mobile part, and the handover is initiated by the mobile station and is controlled by the base station. It is highly probable that advance information from the network operator will also be required in this case about which channels [lacuna] (these are essentially the codes, since the frequency reuse is unity).

In all the scenarios mentioned above, the monitoring is carried out by means of the mobile station.

The problem of initial monitoring (information about channels on which the Broadcast Control CHannel of the adjacent cells can be received) has until now been solved in the cellular

field by means of advance information provided in advance by the network operator and intended for the respective mobile station, with this advance information having been transmitted to the relevant mobile station by the active base station using the Broadcast Control CHannel. The only exception is the DECT scenario, since, in this case, there is no need for initial monitoring for the coordinated, licensed mode. It is thus necessary during cellular DECT operation for the mobile station to continuously scan adjacent frequencies looking for the Broadcast Control CHannel for an intercell handover. However, with respect to standby times, this is not an optimum solution [lacuna] asymmetric data services (allocation of a number of timeslots). In uncoordinated DECT operation, only an intracell handover is possible, so that there is no need for initial monitoring.

In the past, no handover has existed from uncoordinated, unlicensed system operation to coordinated, licensed system operation (for example residential TDD-UMTS system to the public FDD-UMTS or public TDD-UMTS system.

The object on which the invention based, in a cellular telecommunications system using wireless telecommunication between mobile parts and base stations, is to provide for telecommunications connections to be handed off from uncoordinated, unlicensed operation of the telecommunications system (residential operation or private operation) to coordinated, licensed operation of the telecommunications system (public operation) and vice versa, with little energy being consumed in the mobile part and with little circuitry complexity in the mobile part.

This object is achieved by the features of patent claim 1.

The idea on which the invention is based is to carry out the initial monitoring problem, mentioned initially, in the base station (first base station) which supports uncoordinated, unlicensed system operation.

This method offers the advantage that the Broadcast Control CHannel search by the first base station, which supports uncoordinated, unlicensed system operation and has no a priori knowledge about the conditions in the adjacent cells, need be

carried out only once by base stations arranged in the adjacent cells, when the appliance is switched on, and then may be carried out once again only at relatively long periodic intervals (see the advantageous development as claimed in claim 2). This information is then signalled (for example using the Broadcast Control Channel) to the mobile part or to the mobile station.

Fundamentally, the advantages for the mobile station are the reduced power consumption, the increase in the standby time, the fact that the initial monitoring is carried out by the first base station, and the reduced complexity in the case of pure residential mobile stations or indoor terminals (the complexity is integrated in the first base station).

Since the first base station receives cell specific information about the adjacent public cells only as a result of the initial monitoring (and, particularly for UMTS, a highly time-consuming computation process is required in order to detect a cell-specific scrambling code without advance information) a dual mode mobile station designed for indoor/outdoor purposes is for the first time able to carry out a particularly time-critical handover from indoor to outdoor.

In the developments of the invention as claimed in claims 3 and 4, the essential idea is for the monitoring to be carried out in the outdoor and indoor base station. Where high asymmetric data rates are used (possible only in the TDD mode), this procedure offers advantages both for the indoor to outdoor handover and for the intracell handover. The monitoring in the first base station can thus be used to provide an asymmetric service with a high downlink data rate and a low uplink data rate, and vice versa, as well as interference measurement on another carrier frequency and, if required, to hand over the entire asymmetric connection to the other carrier frequency (interfrequency handover). An indoor to outdoor handover while maintaining the high data rate is likewise possible.

If the monitoring functionality is integrated not only in the base station but also in the mobile station, then an asymmetric service with a low downlink data rate and a high uplink data rate can be handed over from one carrier frequency to a carrier (interfrequency handover). In this situation, the

monitoring cannot be carried out by the base station since virtually all the timeslots are used for reception in this case - and the monitoring is in this case carried out by the mobile station.

5 An exemplary embodiment of the invention will be explained with reference to Figures 2 to 7, in which:

Based on the UMTS scenario with the detail from a universal mobile telecommunications network and a universal mobile telecommunications system, as shown in Figure 1, which operates both in the uncoordinated, unlicensed system mode and in the coordinated, licensed system mode, Figure 2 shows a modified UMTS scenario with initial monitoring,

10 Figures 3 to 7 show timeslot illustrations for the monitoring by the base stations BS1, BS2 and the mobile stations MS1. . . MSn, MSn+1. . . MSn+m.

Based on the UMTS scenario with the detail from a universal mobile telecommunications network and a universal mobile telecommunications system, as shown in Figure 1, which operates both in the uncoordinated, unlicensed system mode and in the coordinated, licensed system mode, Figure 2 shows a modified UMTS scenario with initial monitoring,

15 In the modified UMTS scenario, universal mobile telecommunications system, as shown in Figure 1, which operates both in the uncoordinated, unlicensed system mode and in the coordinated, licensed system mode, Figure 2 shows a modified UMTS scenario with initial monitoring, the first base station BS1 and the first mobile stations MS1.. . MSn - as in the UMTS scenario in Figure 1 - are located in the first radio cell FZ1. Adjacent to this first base station BS1 - in which case, for example, adjacency occurs, by definition, when the associated radio cells, the first radio cell FZ1 and the second radio cell FZ2, are adjacent to one another or overlap - there are, firstly, the second base station BS2, which is located in the second radio cell FZ2, which completely covers the first radio cell FZ1 with the first base station BS1, and, secondly, further second base stations BS1.1. . . BS1.6 which, although they are in the form of first base stations BS1 are referred to as further second base stations BS2 owing to their adjacency to the first base station

BS1 in the first radio cell FZ1, and which second base stations BS1.1. . .BS1.6 are arranged in further second radio cells FZ1.1. . .FZ1.6, which are immediately adjacent to the first radio cell FZ1 with the first base station BS1 and are admittedly in the form of a first radio cell FZ1 but are referred to as further second radio cells FZZ owing to the adjacency to the first radio cell FZ1 with the first base station BS1.

For the initial monitoring, the first base station BS1, which supports uncoordinated, unlicensed system operation and is associated with the first cell, FZ1, in a first monitoring mode receives messages which are relevant for handing off telecommunications connections and which are transmitted by at least one of the second base stations BSZ, BS1.1. . .BS1.6 which are adjacent to the first base station BS1, support coordinated, licensed system operation or uncoordinated, unlicensed system operation and are each associated with the second cell FZ2, FZ1.1. . .FZ1.6, on in each case one first telecommunications channel which is in the form of the Broadcast Control CHannel BCCH.

After this, the first base station BS1 assesses the information content and reception quality of the received messages and transmits a list, organized on the basis of the reception quality, of parameters which are required for handing over the telecommunications connection and are each associated with one of the second base stations BSZ, BS1.1. . .BS1.6, on a second telecommunications channel which is in the form of the Broadcast Control CHannel BCCH, to the first mobile stations MS1.. .MSn which are located in the first cell FZ1.

Figures 3 to 7 each use a timeslot representation with eight timeslots ZS1... ZS8 to show the monitoring scenario for the base stations BS1, BSZ, BS1.1. . .BS1.6 and the mobile stations MS1.. .MSn, MSn+1. . .MSn+m. Common features of all the figures 3 to 7 are that the base stations BS1, BSZ, BS1.1. . .BS1.6 use a first timeslot ZS1 as the Broadcast Control Channel BCCH, and that there is a bidirectional, asymmetric data link at a first frequency fi in each case between the base stations BS1, BSZ, BS1.1. . .BS1.6 and the mobile stations MS1.. .MSn, MSn+1. . .MSn+m, said data link in each case having a number of reception timeslots Rx1 and transmission timeslots Tx1 and in each case

extending over at least the timeslots ZS2. . . ZS6. Furthermore, for example, the expression $M(f_2)$, $M(f_3)$ in each case indicates that the base stations BS1, BS2, BS1.1. . . BS1.6 and/or the mobile stations MS1. . . MSn, MSn+1. . . MSn+m carry out monitoring M on a second frequency fZ or on a third frequency f3.

In detail, said figures show the following information:

Figure 3 shows that the mobile station MS1. . . MSn, MSn+1. . . MSn+m maintains a bidirectional, asymmetric data link with the reception timeslots Rx1 and transmission timeslots Tx1 in the timeslots ZS1. . . ZS6 with the base station BS1, BSZ, BS1.1. . . BS1.6, that the base station BS1, BSZ, BS1.1. . . BS1.6 maintains a further bidirectional data link to another mobile station in the timeslots ZS7, ZS8, and that the mobile station MS1. . . MSn, MSn+1. . . MSn+m initiates a second monitoring mode, for handing off information which is relevant to telecommunications networks, by monitoring M, for example, on the second frequency fZ in the timeslots ZS7, ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base stations BS1.1. . . BS1.6.

Figure 4 shows that the mobile station MS1. . . MSn, MSn+1. . . MSn+m maintains a bidirectional, asymmetric data link with the reception timeslots Rx1 and transmission timeslots Tx1 in the timeslots ZS1. . . ZS6 with the base station BS1, BSZ, BS1.1. . . BS1.6, that the mobile station MS1. . . MSn, MSn+1. . . MSn+m initiates the second monitoring mode for handing off information which is relevant for telecommunications connections by monitoring M, for example, on the third frequency f3 in the timeslots ZS7, ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1. . . BS1.6, and that the base station BS1, BSZ, BS1.1. . . BS1.6 initiates the second monitoring mode for handing off information which is relevant for telecommunications connections by monitoring M for example, on the second frequency

fZ in the timeslots ZS7, ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BS2, BS1.1. . .BS1.6.

Figure 5 shows that the mobile station MS1. . .MSn, MSn+1. . .MSn+m maintains a bidirectional asymmetric data link with the reception timeslots 3x1 and transmission timeslots Tx1 in the timeslots ZS1... ZS7 with the base station BS1, BSZ, BS1.1. . .BS1.6, and that the base station BS1, BSZ, BS1.1. . .BS1.6 initiates the second monitoring mode for handing off information which is relevant to telecommunications connections by monitoring M, for example, on the second frequency fZ in the timeslot ZS8, in order to transmit the asymmetric data link at a maximum data transmission rate, which can be predetermined, in the downlink direction and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1. . .BS1.6.

Figure 6 shows that the mobile station MS1. . .MSn, MSn+1. . .MSn+m maintains a bidirectional asymmetric data link with the reception timeslots Rx1 and transmission timeslots Tx1 in the timeslots ZS1... .ZS7 with the base station BS1, BSZ, BS1.1. . .BS1.6, and that the base station BS1, BSZ, BS1.1. . .BS1.6 initiates the second monitoring mode for handing off information which is relevant to telecommunications connections by monitoring M, for example, on the second frequency f2 in the timeslot ZS8, in order to transmit the asymmetric data link at a minimum data transmission rate, which can be predetermined, in the downlink direction and at a maximum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1. . .BS1.6.

Figure 7 shows that the mobile station MS1. . .MSn, MSn+1. . .MSn+m maintains a bidirectional, asymmetric data link with the reception timeslots 3x1 and transmission timeslots Tx1 in the timeslots ZS1... .ZS7 with the base station BS1, BS2, BS1.1. . .BS1.6, that the mobile station MS1. . .MSn, MSn+1. . .MSn+m initiates the second monitoring mode for handing off information which is relevant to telecommunications connections by monitoring

M, for example, on the third frequency f3 in the timeslot ZS8, in order to transmit the asymmetric data link at a minimum data transmission rate, which can be predetermined, in the downlink direction and at a maximum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1, BSZ, BS1.1. . .BS1.6, and that the base station BS1.1. . .BS1.6 initiates the second monitoring mode for handing off information which is relevant to telecommunications connection by monitoring M, for example, on the second frequency f2 in the timeslot ZS8, in order to transmit the asymmetric data link at a minimum data transmission rate, which can be predetermined, in the downlink direction and at a maximum data transmission rate, which can be predetermined, in the uplink direction via the base station BS1.1. . .BS1.6.

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Patent Claims

1. A method for controlling the handover of telecommunications connections between mobile parts and base stations in cellular telecommunications systems using wireless telecommunication, with the following features:

- (a) the telecommunications connections are initiated by the mobile parts (MS1. . . MSn, MSn+1. . . MSn+m) and are controlled by the base stations (BS1, BS2, BS1.1. . . BS1.6) in uncoordinated, unlicensed operation of the telecommunications system (UMTS) and in coordinated, licensed operation of the telecommunications system (UMTS),
- (b) a first base station (BS1) which supports uncoordinated, unlicensed system operation and is associated with a first cell (FZ1) receives messages which are relevant in a first monitoring mode for handing off telecommunications connections and are in each case sent by at least one second base station (BS, BS1.1. . . BS1.6), which is adjacent to the first base station (BS1), supports coordinated, licensed system operation or uncoordinated, unlicensed system operation and is in each case associated with a second cell, on a first telecommunications channel which is in the form of a Broadcast Control CHannel (BCCH),
- (c) the first base station (BS1) assesses the information content and reception quality of the received messages, and transmits a list, organized on the basis of the reception quality, of parameters which are required for handing over the telecommunications connection and which can each be associated with one of the second base stations (BS2, BS1.1. . . BS1.6) on a second telecommunications channel, which is in the form of a Broadcast Control CHannel (BCCH) to first mobile parts (MS1. . . MSn) which are located in the first cell (FZ1).

2. The method as claimed in claim 1, characterized in that the first monitoring mode is switched on at predetermined periodic time intervals, starting when the first base station (BS1) is switched on.

3. The method as claimed in claim 1 or 2, characterized in that a second monitoring mode for handing off information which is relevant to telecommunications connections is initiated in the mobile part (MS1... MSn, MSn+1. . . MSn+m) and/or in the base station (BS1, BS2, BS1.1. . . BS1.6) in order to transmit asymmetric data links at a maximum data transmission rate, which can be predetermined, in the downlink direction, and at a minimum data transmission rate, which can be predetermined, in the uplink direction via the base station (BS1, BS2, BS1. 1. . . BS1. 6).

4. The method as claimed in one of claims 1 to 3, characterized in that a second monitoring mode for handing off information which is relevant for telecommunications connections is initiated in the base station (BS1, BS2, BS1.1. . . BS1.6) in order to transmit asymmetric data links at a minimum data transmission rate, which can be predetermined, in the downlink direction, and at a maximum data transmission rate, which can be predetermined, in the uplink direction via the base station (BS1, BS2, BS1. 1. . . BS1. 6).

5. The method as claimed in one of claims 1 to 4, characterized in that wireless telecommunication is carried out using the CDMA, FDMA and/or TDMA access methods, and using the TDD and/or FDD principle.

Abstract

Method for controlling the handover of telecommunications connections between mobile parts and base stations in cellular telecommunications systems using wireless telecommunication

In a cellular telecommunications system using wireless telecommunication between mobile parts and base stations, in order to provide for the handing off of telecommunications connections from uncoordinated, unlicensed operation of the telecommunications system to coordinated, licensed operation of the telecommunications system and vice versa, with little energy being consumed in the mobile part and with little circuitry complexity in the mobile part, initial monitoring is carried out in the base station which supports uncoordinated, unlicensed system operation.

FIGURE 2

09/720444

526 Rec'd PCT/PTO 22 DEC 2000

BOX PCT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY - CHAPTER II

APPLICANT: BOLINTH, E. et al.
ATTORNEY DOCKET NO: P00,1953
INTERNATIONAL APPLICATION NO: PCT/DE99/01830
INTERNATIONAL FILING DATE: 23 JUN 1999
INVENTION: METHOD FOR CONTROLLING HANDOVER
OF TELECOMMUNICATION CONNECTIONS
BETWEEN MOBILE PARTS AND BASE
STATIONS IN CELLULAR
TELECOMMUNICATIONS SYSTEMS

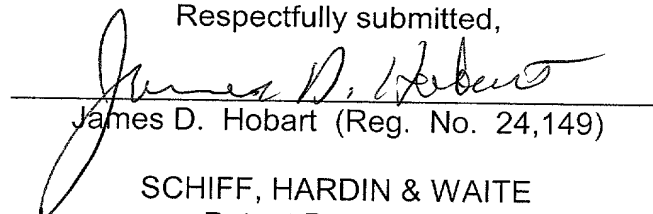
ASSISTANT COMMISSIONER FOR PATENTS
Washington, DC 20231

SUBMISSION OF DRAWINGS

Sir:

Applicants herewith submit five sheets of drawings, namely Figures 1 - 7, in the
above-referenced PCT application.

Respectfully submitted,

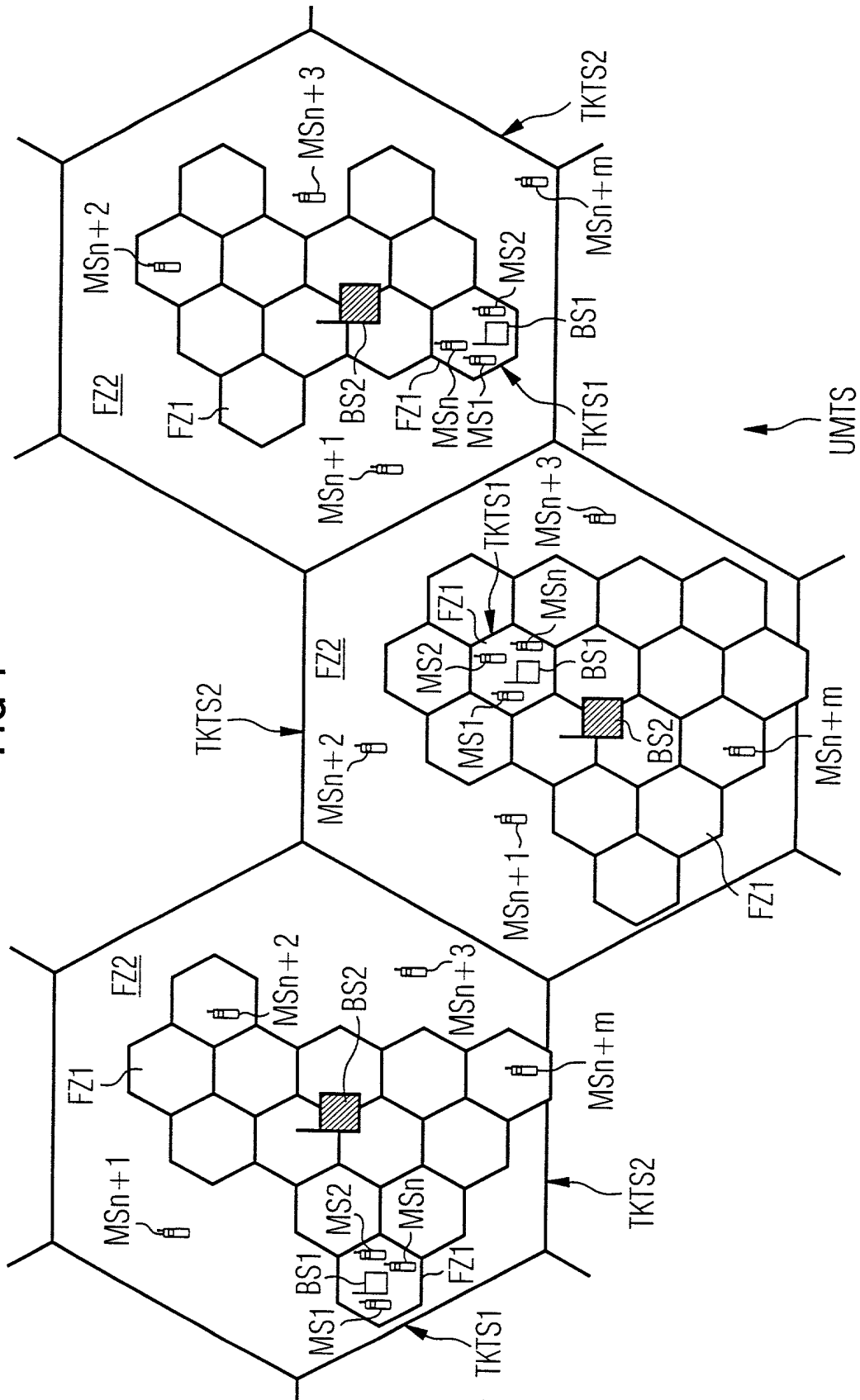

James D. Hobart (Reg. No. 24,149)

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Patent Department
6600 Sears Tower
233 South Wacker Drive
Chicago, IL 60606
Telephone: (312) 258-5790
Attorneys for Applicant

Date: 12/22/2000

1/5

FIG 1



2/5

FIG 2

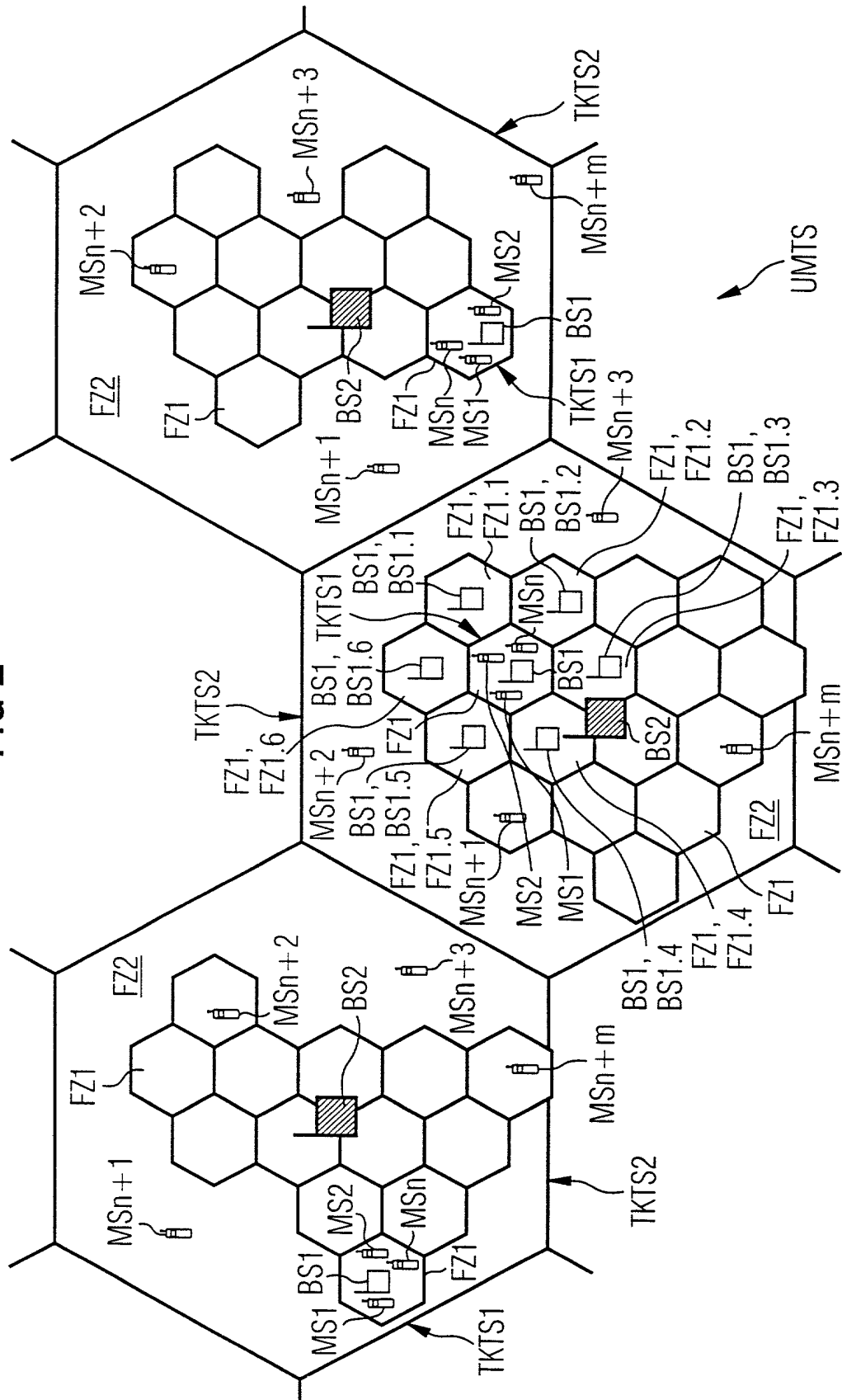


FIG 3

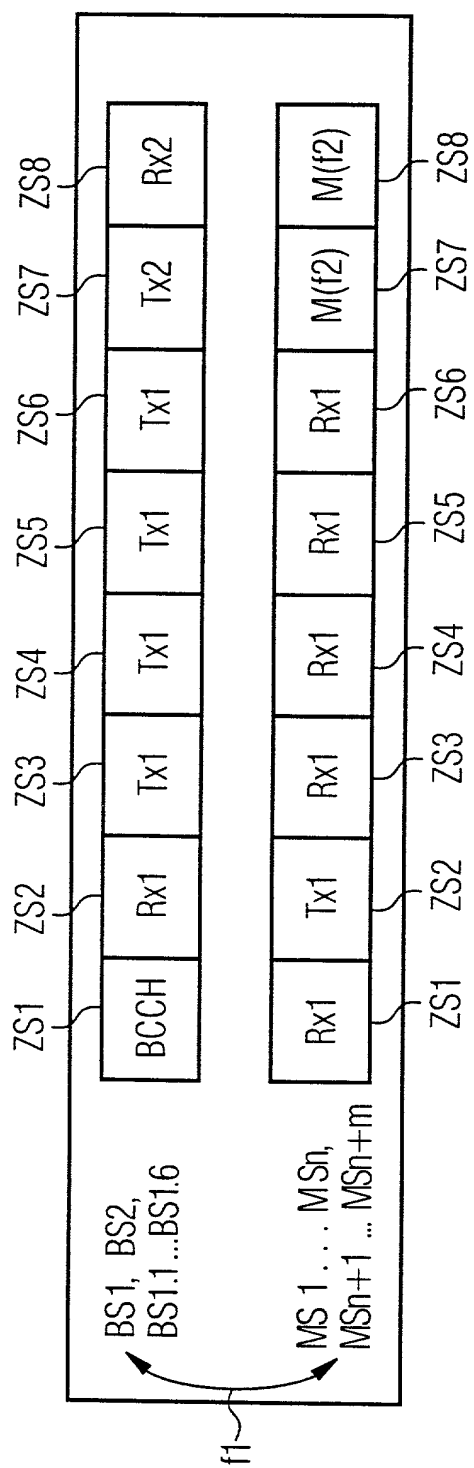


FIG 4

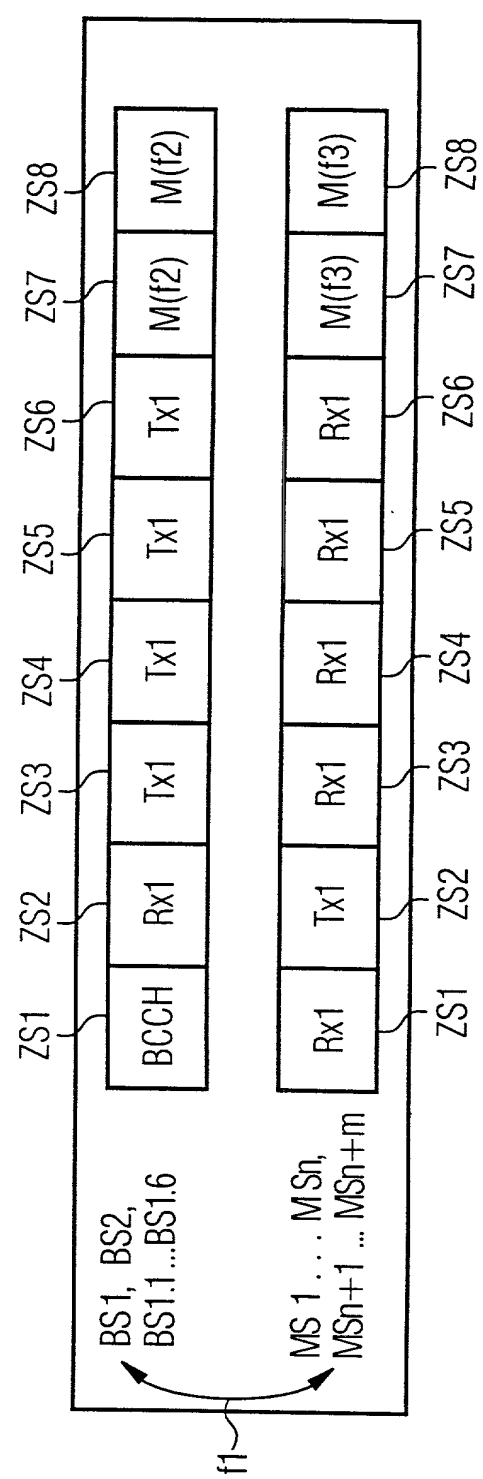


FIG 5

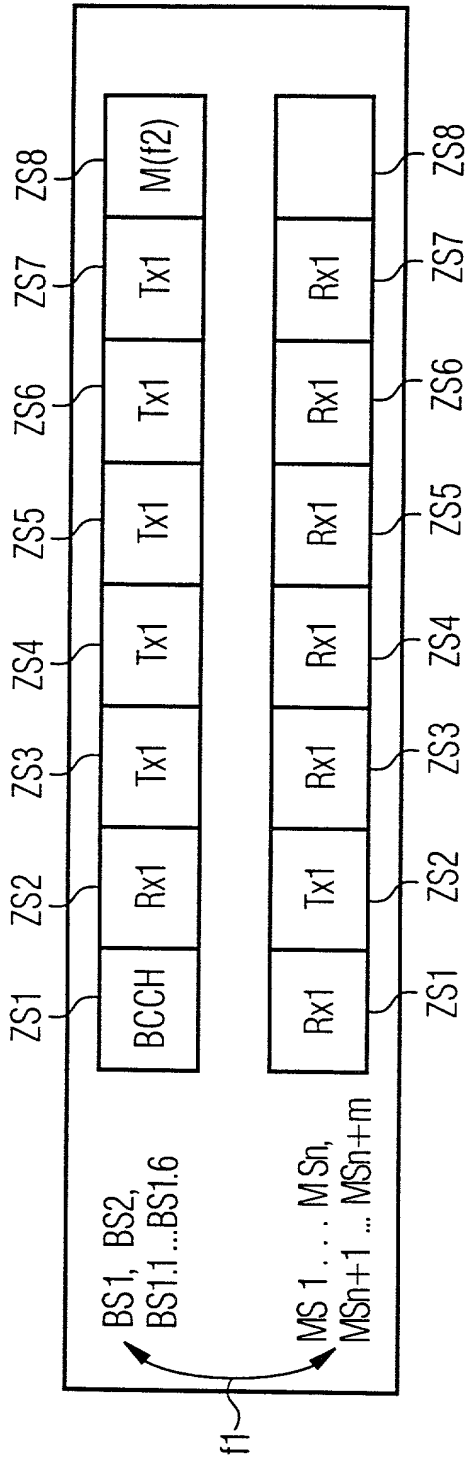


FIG 6

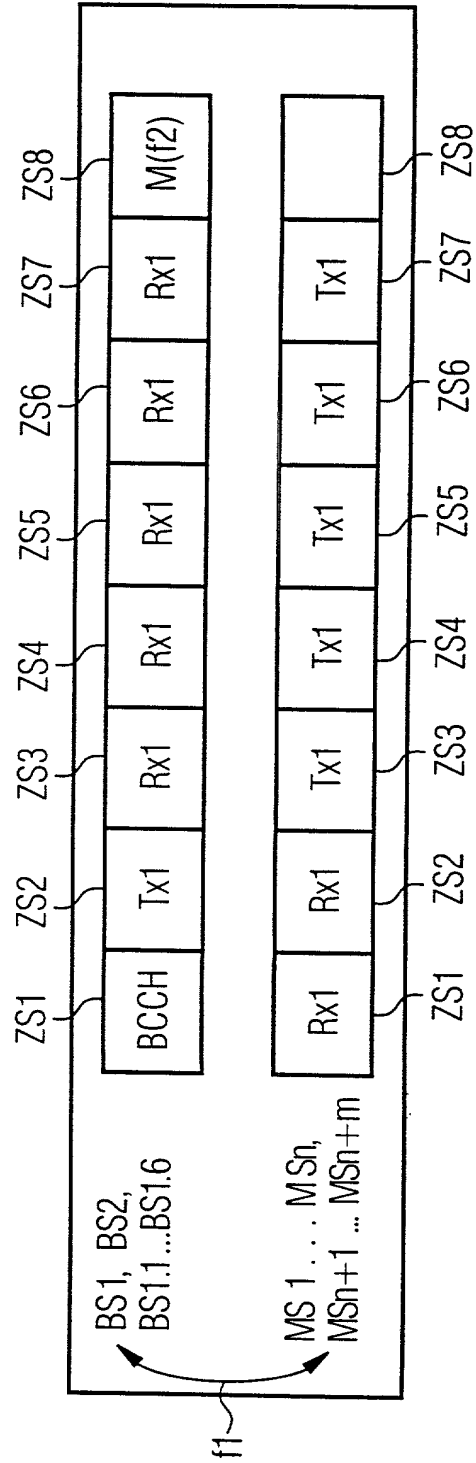
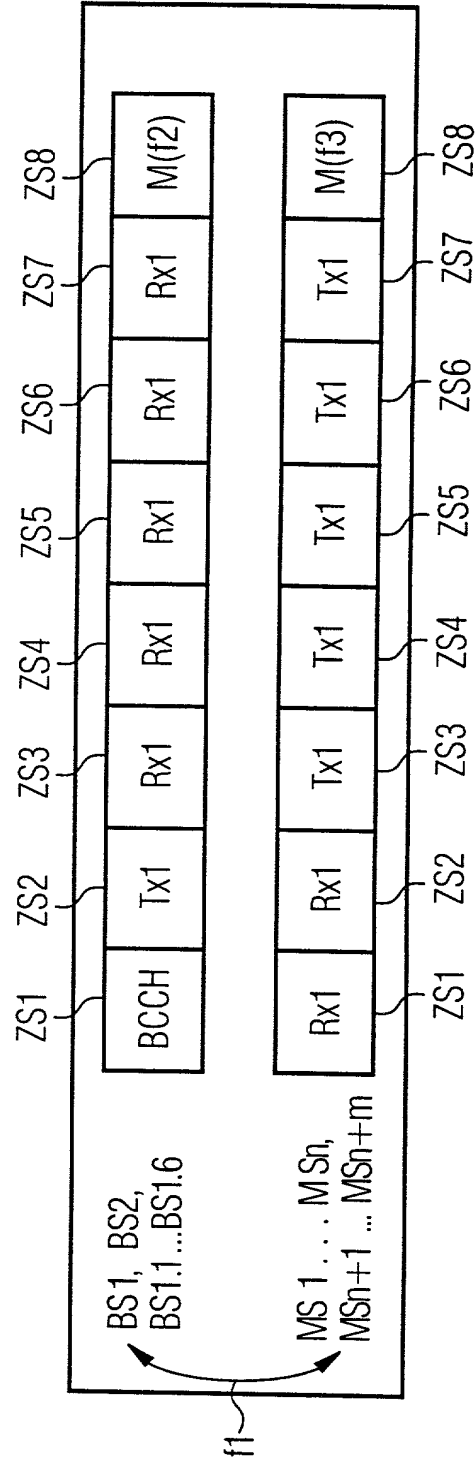


FIG 7



-1/5-

FIG 1

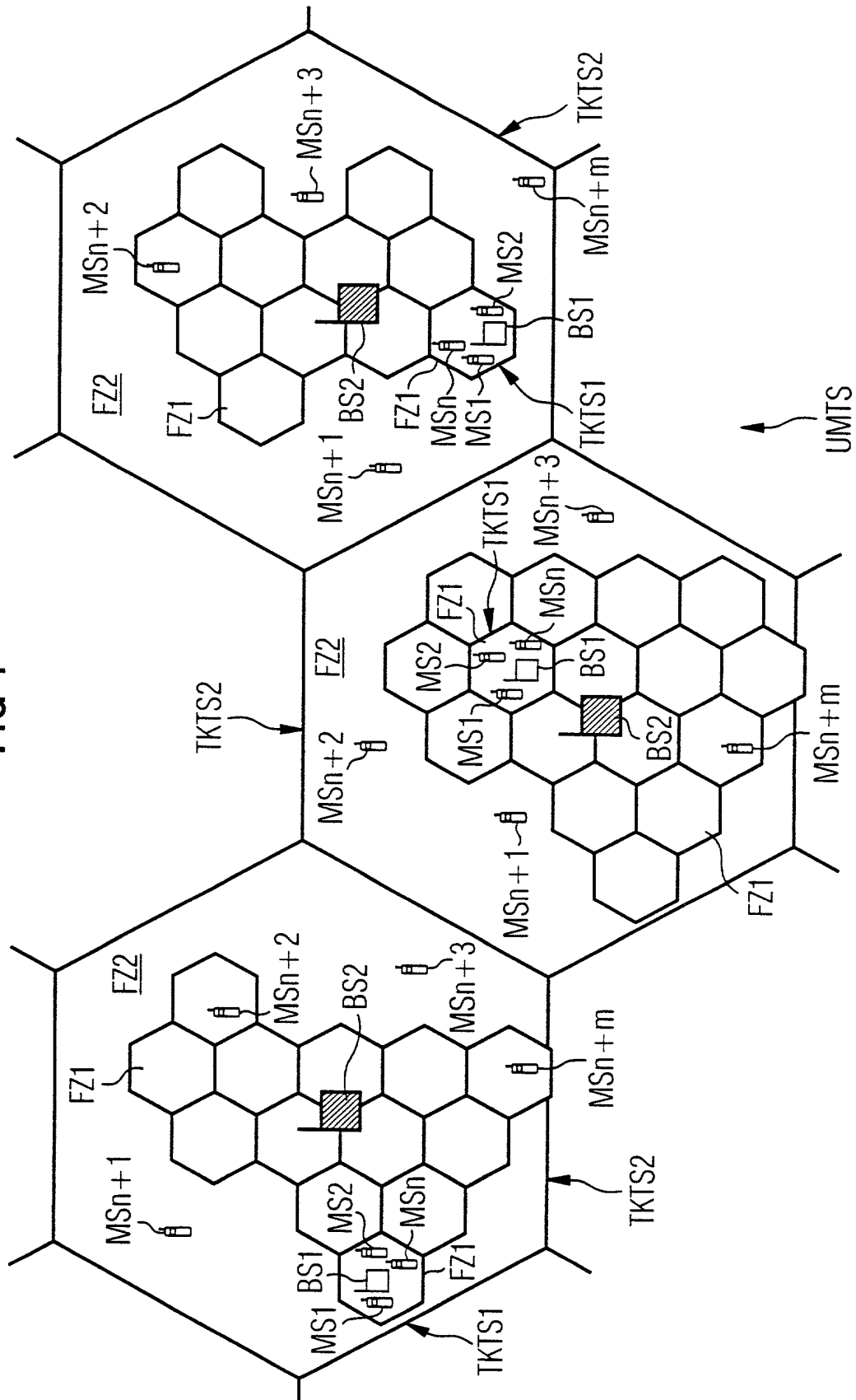
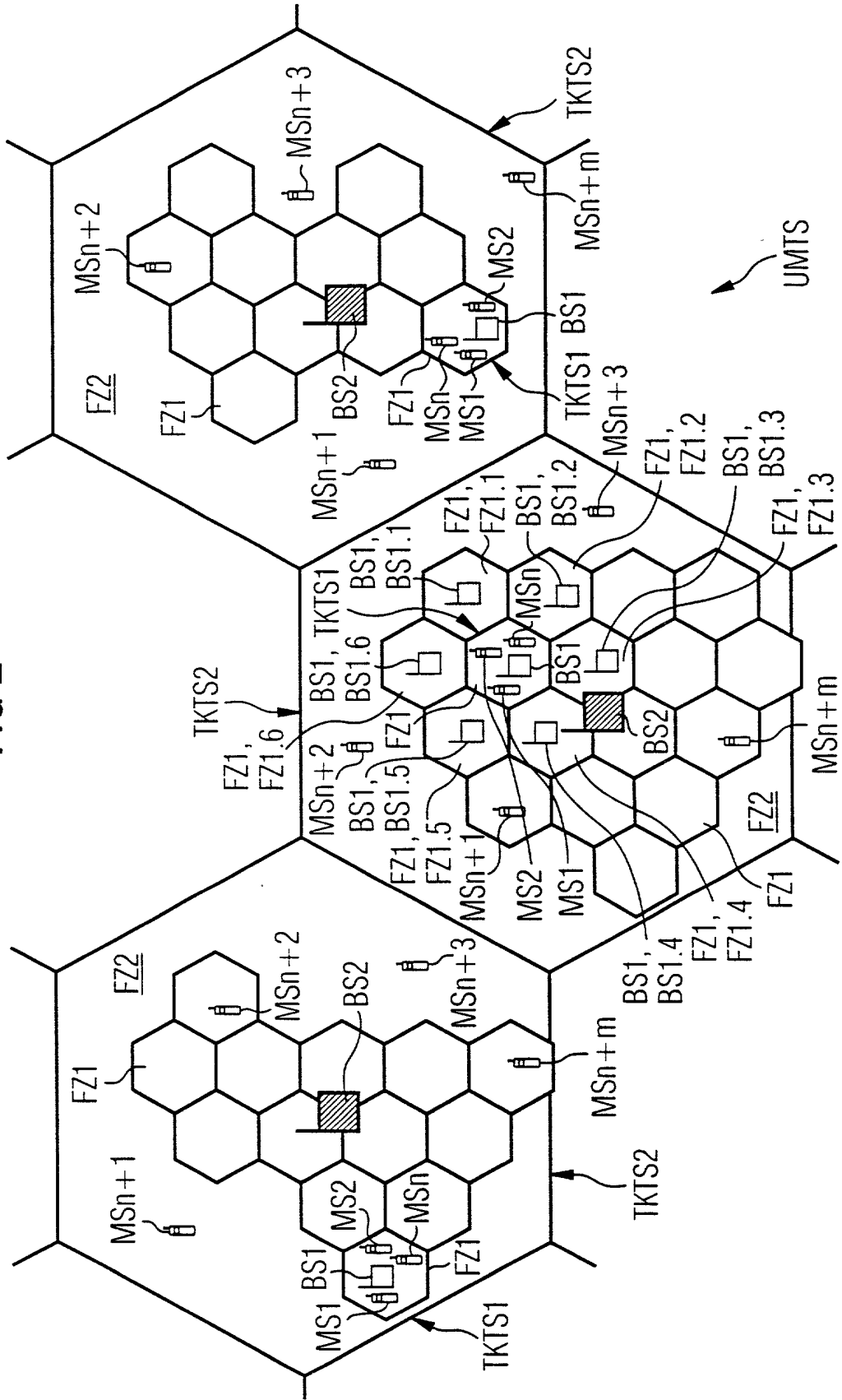
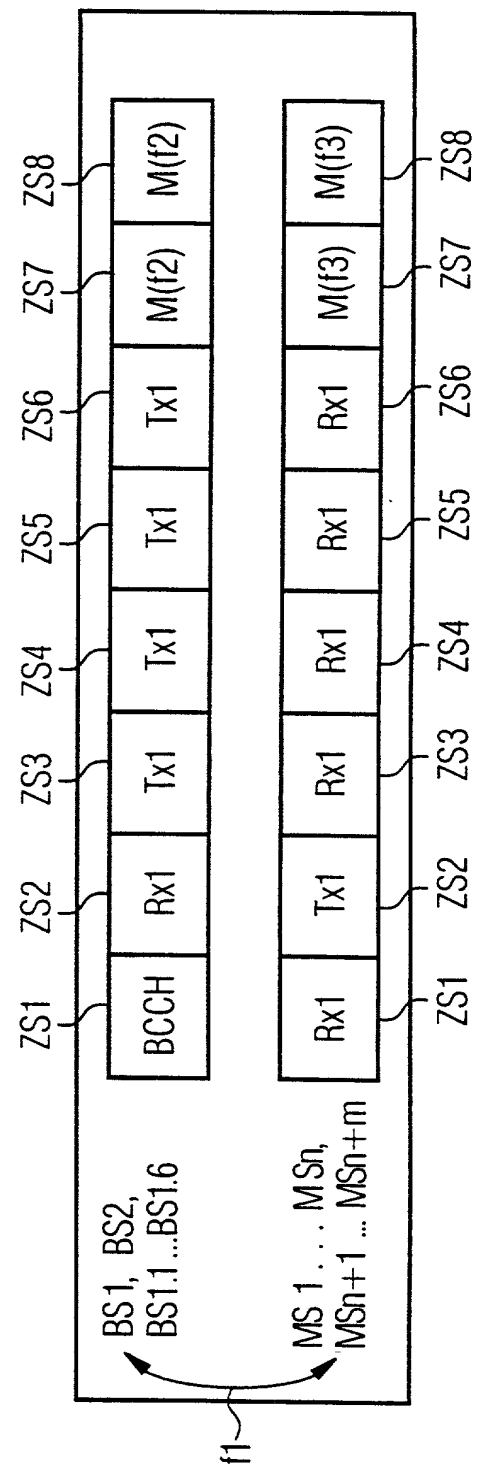
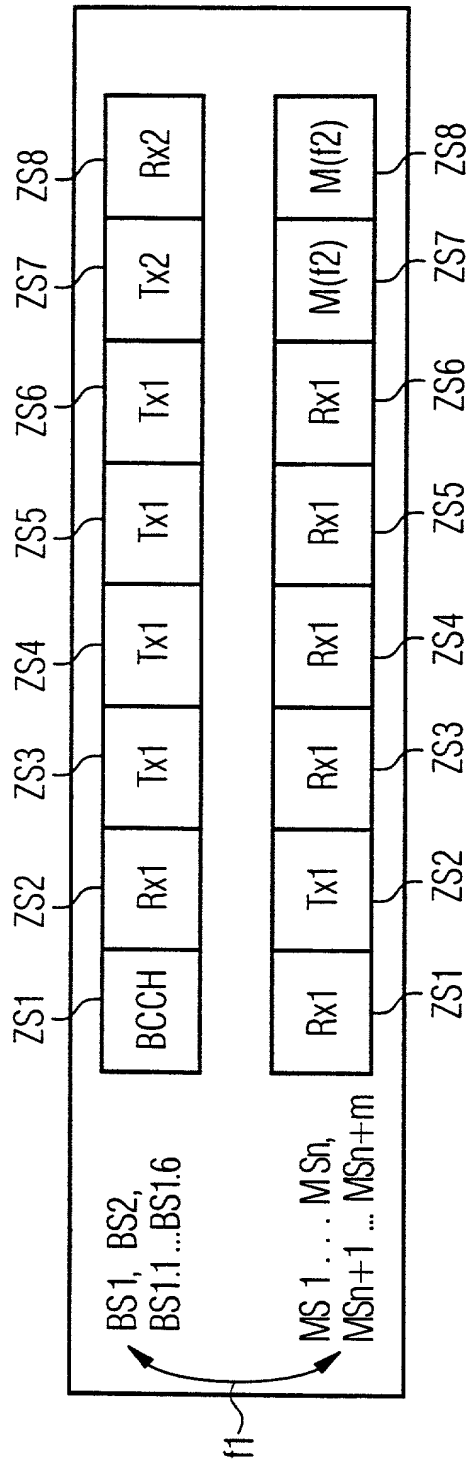


FIG 2





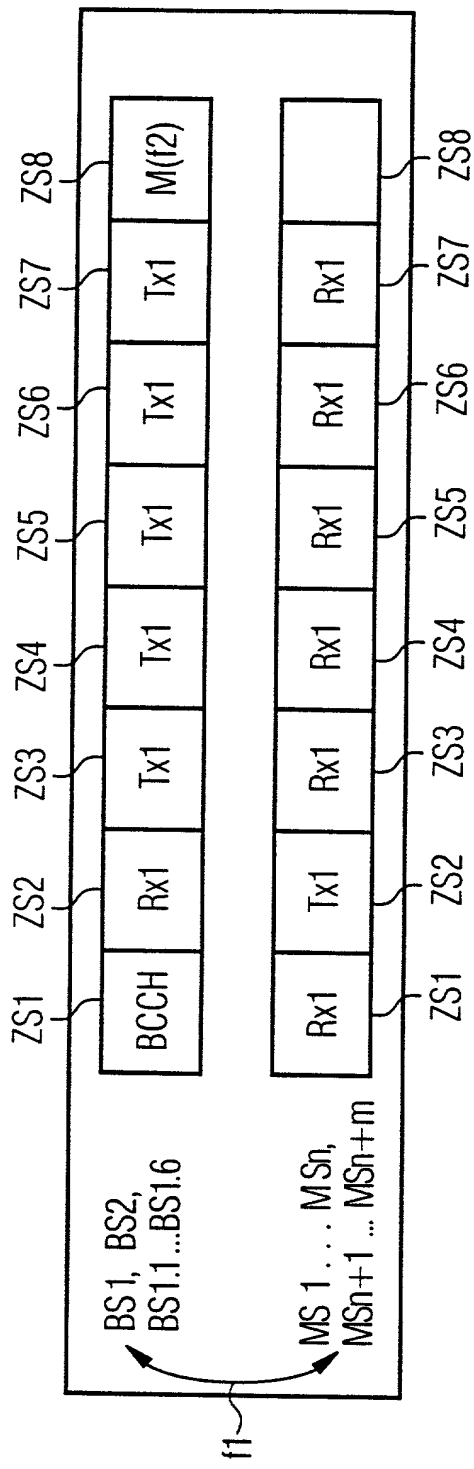


FIG 5

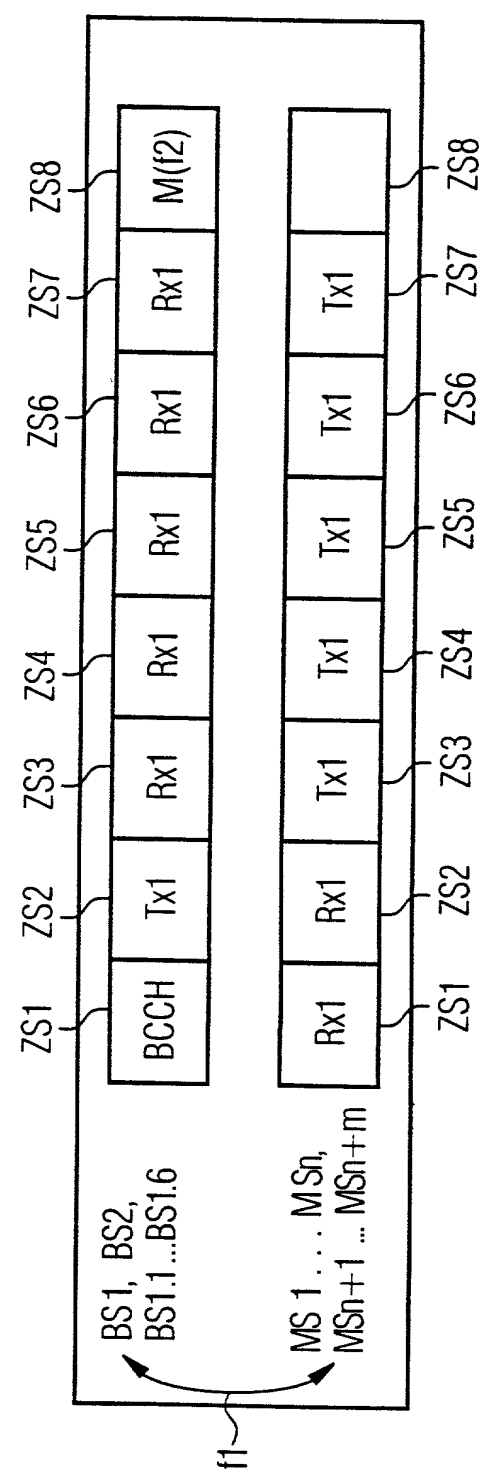
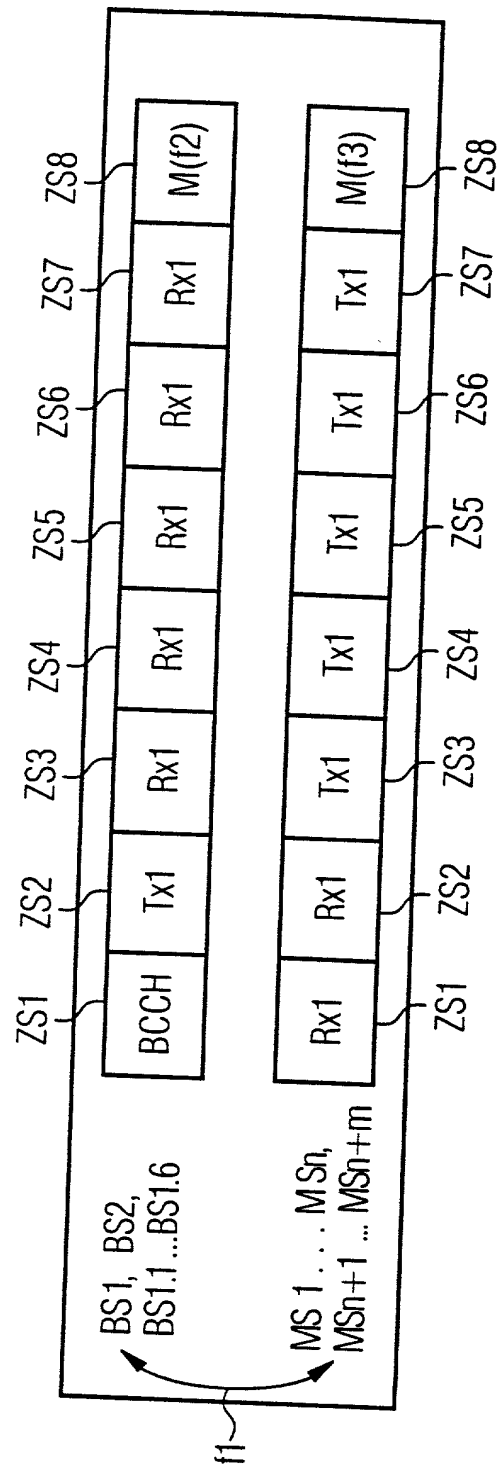


FIG 6

FIG 7



BOX PCT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY - CHAPTER II

APPLICANT: BOLINTH, E. et al.
ATTORNEY DOCKET NO: P00,1953
INTERNATIONAL APPLICATION NO: PCT/DE99/01830
INTERNATIONAL FILING DATE: 23 JUN 1999
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BETWEEN MOBILE PARTS AND BASE
STATIONS IN CELLULAR
TELECOMMUNICATIONS SYSTEMS

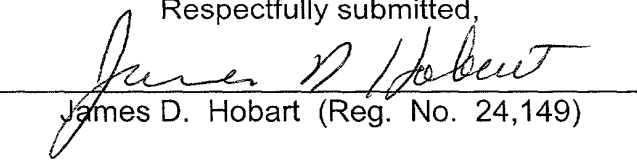
ASSISTANT COMMISSIONER FOR PATENTS
Washington, DC 20231

REQUEST FOR APPROVAL OF DRAWING CHANGES

Sir:

In the above-referenced PCT application, Applicants respectfully request approval of the changes, as marked in red, on the drawing copies attached hereto.

Respectfully submitted,


James D. Hobart (Reg. No. 24,149)

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Patent Department
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Telephone: (312) 258-5790
Attorneys for Applicant
Date: 12/22/2000

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: (Name und Registrationsnummer anführen)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842) Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gröss (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

Telefongespräche bitte richten an:
(Name und Telefonnummer)

Direct Telephone Calls to: (name and telephone number)

312/876-0200
Ext. _____

Postanschrift:

Send Correspondence to:

HILL, STEADMAN & SIMPSON
A Professional Corporation
85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders:		Full name of sole or first inventor:	
BOLINTH, Edgar			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
<i>[Signature]</i>	27.11.00		
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Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Rheindahlener Str. 88			
D-41189 Mönchengladbach			
Bundesrepublik Deutschland			
Voller Name des zweiten Miterfinders (falls zutreffend):		Full name of second joint inventor, if any:	
SCHWARK, Uwe			
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
<i>[Signature]</i>	28.11.00		
Wohnsitz		Residence	
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Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Freiheitstr. 6			
D-46399 Bocholt			
Bundesrepublik Deutschland			

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Verfahren zum Steuern des Weiterreichens
von Telekommunikationsverbindungen
zwischen Mobilteilen und Basisstationen in
zellularen Telekommunikationssystemen mit
drahtloser Telekommunikation

deren Beschreibung

(zutreffendes ankreuzen)

☒ hier beigelegt ist.

☐ am _____ als

PCT internationale Anmeldung

PCT Anwendungsnummer _____

eingereicht wurde und am _____

abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which

(check one)

☐ is attached hereto.

☐ was filed on _____ as

PCT international application

PCT Application No. _____

and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

198 27 919.1 Germany 23. Juni 1998
(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☒ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgegeben)

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgeben)

(Status)
(patented, pending,
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patenten gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Verfahren zum Steuern des Weiterreichens von Telekommunikationsverbindungen zwischen Mobilteilen und Basisstationen in zellularen Telekommunikationssystemen mit drahtloser Telekommunikation

deren Beschreibung

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

☐ am _____ als

PCT internationale Anmeldung

PCT Anwendungsnummer _____

eingereicht wurde und am _____

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the specification of which

(check one)

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☐ was filed on _____ as

PCT international application

PCT Application No. _____

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German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

198 27 919.1 Germany 23. Juni 1998
(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☒ ☐
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Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
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(Nummer) (Land) (Tag Monat Jahr eingereicht)

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(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgegeben)

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

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(Anmeldedatum)

(Status)
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And I hereby appoint

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(Name und Telefonnummer)


Direct Telephone Calls to: *(name and telephone number)*

312/876-0200
Ext. _____

Postanschrift:

Send Correspondence to:

HILL, STEADMAN & SIMPSON
A Professional Corporation
85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders:		Full name of sole or first inventor:	
FÄRBER, Michael			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
	22.11.00		
Wohnsitz		Residence	
D-82515 Wolfratshausen, Germany			
Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Schiesssstattstr. 12A			
D-82515 Wolfratshausen			
Bundesrepublik Deutschland			
Voller Name des zweiten Miterfinders (falls zutreffend):		Full name of second joint inventor, if any:	
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
Wohnsitz		Residence	
Staatsangehörigkeit		Citizenship	
Postanschrift		Post Office Address	

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Verfahren zum Steuern des Weiterreichens von Telekommunikationsverbindungen zwischen Mobilteilen und Basisstationen in zellularen Telekommunikationssystemen mit drahtloser Telekommunikation

deren Beschreibung

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

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PCT internationale Anmeldung

PCT Anmeldungsnummer _____

eingereicht wurde und am _____

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☒ ☐
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Ja Nein

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(Application Serial No.)
(Anmeldesenenummer)

(Filing Date)
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(Status)
(patentiert, anhangig,
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(Status)
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Send Correspondence to:

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85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders: SITTE, Armin	Full name of sole or first inventor:
Unterschrift des Erfinders: <i>[Signature]</i> Datum: 27 Nov. 2000	Inventor's signature: _____ Date: _____
Wohnsitz: D-10405 Berlin, Germany	Residence:
Staatsangehörigkeit: Bundesrepublik Deutschland	Citizenship:
Postanschrift: Prenzlauer Allee 237 D-10405 Berlin Bundesrepublik Deutschland	Post Office Address:
Voller Name des zweiten Miterfinders (falls zutreffend): ULRICH, Thomas	Full name of second joint inventor, if any:
Unterschrift des Erfinders: <i>[Signature]</i> Datum: 27 Nov 2000	Second Inventor's signature: _____ Date: _____
Wohnsitz: D-13505 Berlin, Germany	Residence:
Staatsangehörigkeit: Bundesrepublik Deutschland	Citizenship:
Postanschrift: Sandhauser Str. 109B D-13505 Berlin Bundesrepublik Deutschland	Post Office Address:

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(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhangig,
aufgegeben)

(Status)
(patented, pending,
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Telefongespräche bitte richten an:
(*Name und Telefonnummer*)

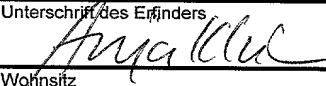
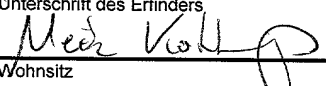
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Send Correspondence to:

HILL, STEADMAN & SIMPSON
A Professional Corporation
85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders:		Full name of sole or first inventor:	
KLEIN, Anja			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
	Nov. 27, 00		
Wohnsitz		Residence	
D-10709 Berlin, Germany			
Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Paderborner Str. 8			
D-10709 Berlin			
Bundesrepublik Deutschland			
Voller Name des zweiten Miterfinders (falls zutreffend):		Full name of second joint inventor, if any	
KOTTKAMP, Meik			
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
	27.11.00		
Wohnsitz		Residence	
D - 10585 Berlin, Germany			
Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Schustehrusstr. 42			
D - 10585 Berlin			
Bundesrepublik Deutschland			

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dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Verfahren zum Steuern des Weiterreichens
von Telekommunikationsverbindungen
zwischen Mobilteilen und Basisstationen in
zellularen Telekommunikationssystemen mit
drahtloser Telekommunikation

deren Beschreibung

(zutreffendes ankreuzen)

☒ hier beigefügt ist.

☐ am _____ als

PCT internationale Anmeldung

PCT Anwendungsnummer _____

eingereicht wurde und am _____

abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which

(check one)

☐ is attached hereto.

☐ was filed on _____ as

PCT international application

PCT Application No. _____

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

198 27 919.1 Germany 23. Juni 1998
(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☒ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgegeben)

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgeben)

(Status)
(patented, pending,
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden können, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: *(Name und Registrationsnummer anführen)*

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842) Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

Telefongespräche bitte richten an:
(Name und Telefonnummer)

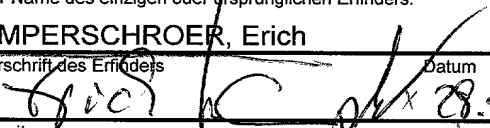
Direct Telephone Calls to: *(name and telephone number)*

312/876-0200
Ext. _____

Postanschrift:

Send Correspondence to:

HILL, STEADMAN & SIMPSON
A Professional Corporation
85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders:		Full name of sole or first inventor:	
KAMPERSCHROER, Erich			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
	28.11.00		
Wohnsitz		Residence	
D-46499 Hamminkeln, Germany			
Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Am Königsbach 27			
D-46499 Hamminkeln			
Bundesrepublik Deutschland			
Voller Name des zweiten Miterfinders (falls zutreffend):		Full name of second joint inventor, if any.	
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
Wohnsitz		Residence	
Staatsangehörigkeit		Citizenship	
Postanschrift		Post Office Address	

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).

Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

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the specification of which

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☐ was filed on _____ as

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(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☒ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

(Number) (Country) (Day Month Year Filed)
(Nummer) (Land) (Tag Monat Jahr eingereicht)

☐ ☐
Yes No
Ja Nein

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(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date)
(Anmeldedatum)

(Status)
(patentiert, anhängig,
aufgegeben)

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

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(Status)
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Telefongespräche bitte richten an:
(Name und Telefonnummer)

Direct Telephone Calls to: *(name and telephone number)*

312/876-0200
Ext. _____

Postanschrift:

Send Correspondence to:

HILL, STEADMAN & SIMPSON
A Professional Corporation
85th Floor Sears Tower, Chicago, Illinois 60606

Voller Name des einzigen oder ursprünglichen Erfinders.		Full name of sole or first inventor:	
BENZ, Michael			
Unterschrift des Erfinders	Datum	Inventor's signature	Date
<i>[Signature]</i>	<i>15 Dec 00</i>		
Wohnsitz		Residence	
D-13629 Berlin, Germany			
Staatsangehörigkeit		Citizenship	
Bundesrepublik Deutschland			
Postanschrift		Post Office Address	
Schuckertdamm 328			
D-13629 Berlin			
Bundesrepublik Deutschland			
Voller Name des zweiten Miterfinders (falls zutreffend):		Full name of second joint inventor, if any:	
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
Wohnsitz		Residence	
Staatsangehörigkeit		Citizenship	
Postanschrift		Post Office Address	

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).